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ORIGINAL ARTICLES

THE INFLUENCE OF FOOD ON MALOCCLUSION*

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THE standard works on orthodontia do not emphasize the idea that the primary cause of abnormalities of tooth arrangement lies in the field of nutrition. Such mechanical forces as thumb-sucking, adenoids and mouth breathing are stressed, while heredity and too early extraction are given prominent mention.

Sir Arthur Keith, at the conclusion of his lectures on bone growth, states that vaulted and narrow arches and adenoid vegetations seem to him to be due to faulty nutrition. He believes that both are symptoms or results of some nutritional disturbance. Prof. Brash, after studying bone deformities, reaches the same conclusion. As additional evidence in support of this idea I present several skulls of monkeys (Macacus rhesus) which have been fed either scorbutic or rickets-producing diets. I present other skulls of the same species in whose diet there were no deficiencies.

It will be observed that, in the former, narrow arches and faces with anterior tooth protrusion have occurred, while in the latter we have broad arches with regular teeth. We therefore have conditions similar to those in adenoid mouth-breathing children, produced experimentally by the character of the food.

An examination of the skulls of experimental monkeys suggests that abnormal arrangement of the teeth depends on the lack of growth or irregular development of the bones in which the tooth crypts lie. Signs which practicing orthodontists recognize as the forerunner of abnormal arrangement are also to be observed, such as lack of spacing of the deciduous teeth just prior to the eruption of the permanent teeth.

*Read before the First International Orthodontic Congress, New York City, August 16-20, 1926.

Measurements of the condyle region of the mandible in monkeys of the same age show the following variations; from the inner aspect of one condyle to that of the other, 24 to 42 mm. of the condyles themselves at their greatest diameter 6 to 11 mm.

The condyles in experimental animals differ from those of normal animals in their form; some are thick and shapeless, with little depth to the sigmoid notch or height to the coronoid process. The coronoid process and condyles are often plastic or show osteoporotic conditions, as indeed, in severe cases, do all the bones of the skull. The following specimens illustrate this condition.

Exemplification of the principles of bone growth to which Prof. Brash calls attention may be observed in these specimens. Sutural growth and external increase occur in a striking fashion among animals which were first given diets that arrested growth, or in which disorganization of formed bone was instituted, and which were later placed on a correct diet, after which rapid bone formation occurred. The following illustrations demonstrate sutural growth and external addition of bone. In one or two cases sutures of the cranial bones have not united, indicating cessation of growth, but later the sutural

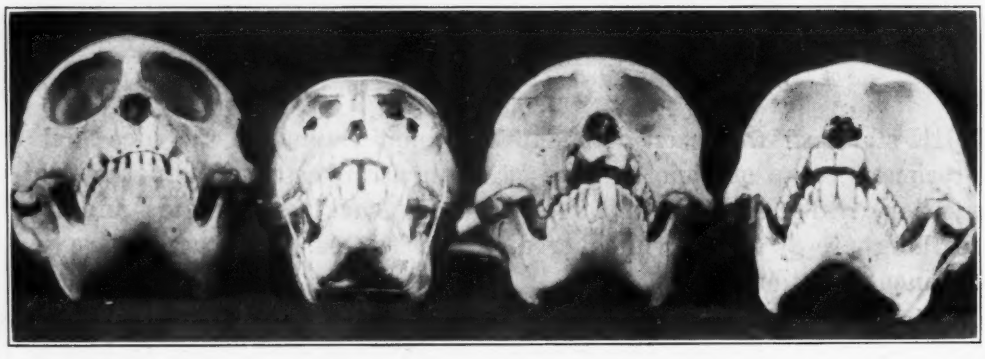


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Fig. 1.—The skull of a young monkey on a fruit, vegetable, and milk diet.
Fig. 2.—Rachitic diet, two years. Narrow maxillae, adenoid-mouth-breathing type of skull.
Fig. 3.—Slight but protracted scorbutic diet begun at a later period; contraction of maxillae confined to anterior region.
Fig. 4.—Normal diet.

spaces have been filled with abnormal deposits of bone or calcified material. Having assured ourselves that nutrition is a basic consideration in dental deformities, we are faced with the difficult task of determining what food factors play an important part in bone formation.

We may limit somewhat the discussion of food if we first determine at what time in life the bone alterations or deformities are most likely to occur. Prof. Brash believes the time to be limited to four years. It is obvious that rapidly forming bone must be most easily affected, and it appears to be quite certain that the deformities which result in abnormal tooth arrangement occur most readily, early in life.

It is therefore the food of infants and young children which especially interest us. This I shall not attempt to discuss in a technical manner.

There can be no question but that human milk is the ideal food for infants. It is more than a food in the sense of containing the raw materials

for tissue building and fuel for energy. It is a biologic fluid containing glandular extracts and other unidentified substances which act in such a manner that it is called a protective food. Perfectly balanced in its proportion, it is adapted to all the needs of the developing infant. Unfortunately the milk of modern mothers is too often scanty or deficient in some of its properties, as may be seen by the failure of children to thrive on it.

The quality of the milk, however, depends in a large measure on the food of the mother and can be improved by improving the diet of the mother.

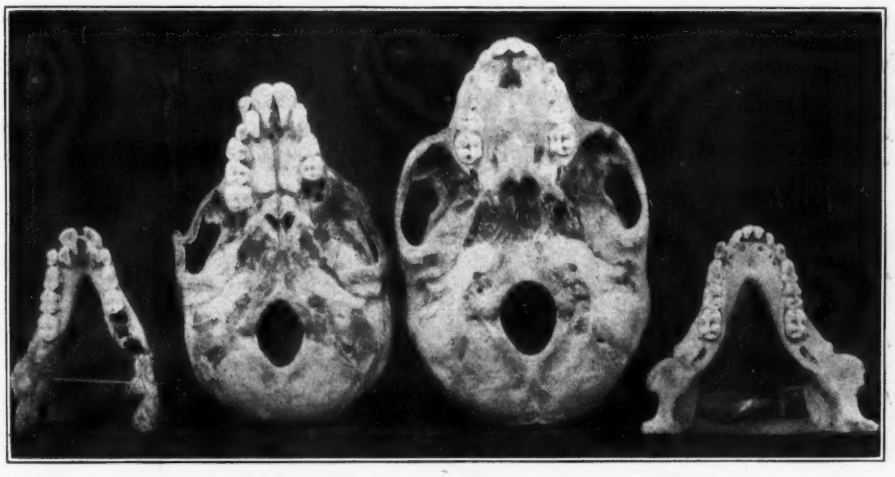


Fig. 5. Fig. 6. Fig. 7. Fig. 8.

Figs. 5 and 6.—Rachitic feeding, two years, two months. Small and narrow maxillae.
Figs. 7 and 8.—Normal feeding. Broad arch and mandible, regular teeth.

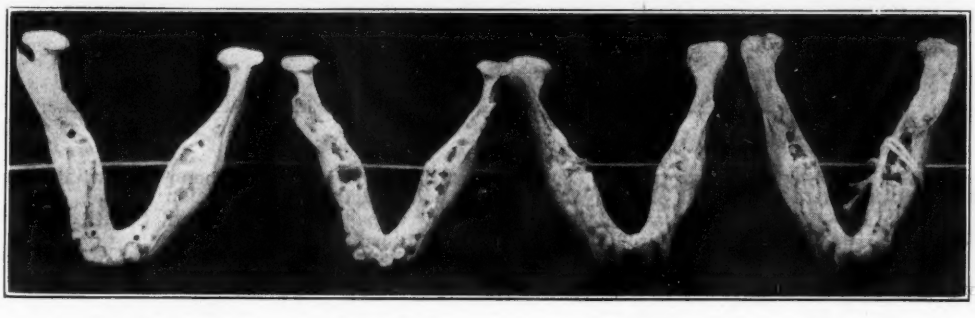


Fig. 9. Fig. 10. Fig. 11. Flg. 12.

Fig. 9.—Normal feeding.
Fig. 10.—Slight scurvy.
Figs. 11 and 12.—Scorbutic deficiency—note thickening of the condyles and enlargement.

It is our opinion that children should be nursed over a longer period than is at present customary and that during lactation the mother should take a diet consisting largely of milk, vegetables, especially leafy vegetables, and fruits.

Among the food factors which are often lacking in infants' food, or which may be destroyed by the preparation of the food, is at least one which specifically affects calcified structures. I refer to the antiscorbutic vitamine—the most labile of all the vitamines. Deprivation of this factor causes bone and

denture formation to cease. In guinea pigs this may be seen as early as from seven to nine days; both bone and dentine is resorbed. On administration of the missing factor new dentine and bone matrix is formed in twenty-four hours. The action of the antiscorbutic factor is rapid and affects bones and teeth specifically. I know of no infant food which contains this substance except mother's milk. The amount and potency of this quality may be markedly increased by the character of the diet and it is for this reason that fresh fruit and leafy vegetables are especially recommended for the mother during the nursing period.

Wilson has found, by radiographic examination of the bones of infants in New York, from one to three months old, and of infants and young children from three months to three years old, that evidence of rickets is discernible in from 97 to 98 per cent of the cases. Such a large incidence of bone dis-

Fig. 13. **Fig. 14.**

Fig. 13.—Slight but protracted scorbutic condition rendering the bone somewhat plastic and resulting in a narrowed skull. The teeth are large and the occlusion good.

Fig. 14.—This animal was obtained young and was given a normal diet until after the eruption of the first permanent molars when a scorbutic diet was given.

turbance in the very young is not without considerable significance to orthodontia. The cause and the cure of rickets is still obscure. One school of investigators believes it is due to disturbance in the ratio between calcium and phosphorus; another to the lack of a vitamine now known as the antirachitic vitamine as distinguished from the fat-soluble A. Cod-liver oil is a remarkably good source of this factor, yet Wilson found that even when infants were given biologically tested cod-liver oil is was apparently without any appreciable effect, except possibly to cause the rickets to heal somewhat earlier. If additional evidence should further discredit the vitamine theory, the probability would increase that the mineral elements are at fault either as to quantity, correct proportion or assimilability. Cow's milk undoubtedly contains sufficient mineral elements. It is possible, however, that on account of its other constituents these may not be as well utilized by the infant as is

desirable. Cow's milk containing more casein and less lactalbumin than human milk forms dense curds in the stomach, while the curd of human milk is finely subdivided and therefore presents more surface area for the digestive enzymes to act on. Cow's milk on account of its high buffer properties lowers the natural stomach acidity and hence is not as digestible, and the freeing of the mineral salts and their utilization depends on digestion.

Proprietary infant foods often are deficient or defective in their mineral content. It seems therefore that vegetable extracts or what is commonly termed "pot liquor" could be advantageously employed as an addition to the diet.

Although the fat-soluble A vitamine has been considered by some as affecting mineral metabolism, I shall not consider it here since Dr. Wolbach and I have found no indication that it has anything to do with mineral utilization.

Fig. 15.—Monkey given a scorbutic diet when very young.

Fig. 16.—Same as Fig. 15, palatal view.

As the child begins to take solid foods, we believe from what we have observed among our animals, that the same kind of diet recommended for the mother should be taken by the child. Cereals we believe should be kept low in the dietary proportion, and the protein also. In respect to protein the standard in milk shows that a child does best on a low percentage. The most rapid caries we have observed in experimental animals, has occurred on a high gelatin and cereal diet. Mother's milk contains 2 per cent of protein; cow's milk, 4 per cent.

Monkeys do well on a milk, vegetable and fruit diet, and since their teeth are very similar to ours we believe that these are the foods which should be used, for they are what modern diets lack. Such a diet contains the vitamines and mineral elements in abundance. The ash is basic, not acidic, and it is not a concentrated diet. Modern diets contain some deficiencies. They also contain many excesses. Excess of protein, of fat, of carbohydrate beyond the natural requirement burdens the system and institutes a physiologic stress which eventually results in harm.

So great is the prevalence of maxillary deformities with their attendant malocclusions that we seem to have accepted them as a sort of necessary evil, and to have become so absorbed in remedial measures that we have neglected to study fundamental causes.

We have probably all seen skulls of ancient and primitive peoples whose splendid dentures and massive jaws excited our admiration and envy; and we have entertained a hazy notion that somehow advancing civilization was responsible for our own sad deficiencies in these respects.

If the studies in animal nutrition carried on in recent years by the Melanbys, McCollum and others, arouse the suspicion that in the matter of diet primitive man had the advantage of us, it would be well to interest ourselves more thoroughly in the subject, in the hope of possible prevention.

Fig. 17.—Young monkey given a diet as deficient in the antiscorbutic factor as possible and still maintain life. The mandible was too extensively affected to articulate with the skull. Note position of nasal cavity as related to orbit.

Fig. 18.—Small arch, large teeth, scorbutic feeding.

In conclusion, I should like to quote this passage from a lecture by Sir Arthur Keith: "When modern man enumerates his dental woes, it is clear that either Nature is neglecting him or he is neglecting Nature. On whichever side the fault may lie there is, without doubt, a grave disharmony between the structural outfit of man's body, and the conditions with which modern civilization has surrounded it. . . . We expect (Nature) to keep up the standard of her dental workmanship, when we swamp our own bodies, as well as the developing tissues of the fetus and infant, with substances she finds difficult to handle and utilize. We demand that she will adjust at once her adaptational machinery to our new modes of living and blame her when she fails to respond. It is all so childish and so unreasonable! All she asks of us is that we shall understand the method of her workmanship and the

materials which she requires in the fashioning of teeth. And if we patiently apply ourselves to her behests I, for one, believe she will give us the dentition we deserve.''

DISCUSSION

Dr. Henry F. Hoffman, Denver, Colorado.—The Congress is to be complimented upon having a paper by a man of Dr. Howe's acknowledged scientific ability, presented so simply and clearly that it is readily grasped and understood.

This paper touches the very foundation upon which the science of orthodontia is built, namely bone growth and development. The essayist brings out the point very clearly that our primary trouble lies in the field of nutrition and that those mechanical forces which have been stressed as causes of malocclusion are in reality merely other symptoms of the same general disturbance which is the chief cause of malocclusion.

We are greatly indebted to Dr. Howe for his efforts in the field of animal experimentation and while the argument remains good that the conclusions drawn from these experiments are based upon the results obtained with animals rather than human subjects, nevertheless if we are to admit that the human being is an animal organism we must acknowledge the weight of the evidence presented by these experiments as well as that of the definite results obtained in the scientific feeding of live stock.

Proper food is necessary to proper nutrition. Proper nutrition is necessary to the proper growth and development of all the tissues including the skeletal structure. If we, as orthodontists, are to secure the best possible results in our efforts to reshape the dental arches and to maintain the shape established, we must bring to our aid that all important factor the proper growth and development of the individual, which cannot be attained without proper nutrition. In the majority of instances so called early orthodontic treatment should consist of attention to the nutritional needs of the patient rather than to the application of orthodontic appliances.

The essayist covers the subject of food in a very thorough and comprehensive manner and makes it quite plain that there is only one complete infant food, namely normal human milk, and that the normal human milk cannot be secured without the proper feeding of the mother.

The essayist also calls attention to the excesses often found in the diet as well as to the deficiencies and the harmful results therefrom.

I want to repeat one paragraph of the essayist, ''So great is the prevalence of maxillary deformities with their attendant malocclusions that we seem to have accepted them as a sort of necessary evil and to have become so absorbed in remedial measures that we have neglected to study fundamental causes.'' I believe that we would all do well to take this sentence home with us and apply it carefully to all our work.

As orthodontists we have the greatest opportunity for benefit to posterity. The orthodontist more than any other professional man has the opportunity to impart to his patients knowledge of proper food and nutrition and the time at which this knowledge must be applied for normal growth and development.

If the orthodontist will make a thorough study of this subject and a conscientious effort to impart his knowledge to his patients he will in cooperation with the pedodontist and pediatrist be accomplishing a wonderful work for humanity as well as giving the greatest possible aid to the fulfillment of his own particular calling.

Dr. A. H. Ketcham, Denver.—I should like to ask a question. Dr. Howe promised we when he could find time that he would examine monkey skulls for short tooth roots or resorbed roots. I should like to ask him to discuss that in closing.

Dr. S. J. Lewis, Detroit.—I should like to ask Dr. Howe if these animals were fed only on the scorbutic diet, whether there were any other deficiencies. In a recent study at the Merrill Farmer School, of Detroit, on mixed human milk, it was found that the

vitamine content of human milk and cow's milk was the same; that is, the human milk did not contain any more of the vitamines than the cow's milk.

Dr. McCallum has recently sent us some rat skulls which were fed an abundance of florine and magnesium carbonate. There were deformities and with the magnesium carbonate deformities of the skulls themselves. I would like to know whether Dr. Howe fed them on a normal diet or scorbutic diet.

Dr. Howe.—Dr. Ketcham spoke about writing me to look for short roots. I have done so but there doesn't seem to be any question but what the roots are a good deal shorter than in those not fed but that relates to tooth formation and I think the growth and formation of a tooth is an easy thing to affect during the formative period of the tooth, and there is no question, I think, but what they are much shorter.

I can't give exact measurements and I have not done work with the specific view of producing irregularities, but we have had so many bone changes and alterations that we can't overlook them.

With regard to the other doctor's question, we have done a good many experiments. I can't go into arguments regarding vitamines. I am trying to show that these one hundred and fifty monkeys have been on a variety of diets and a good many other animals on a number of other different diets at different times, and there is more than one way of adjusting it. We don't know what a normal mineral content of anything is but we can guess at it. We have the form, the assimilability, the water content of foods, and one hundred and one things. I do not want to go into it here, but the long and short of the thing, from what we can see, is that it is very simple as long as we stick to natural, untreated food, and the things that we need to urge are what I said: use of milk, of vegetables, and fruits mainly, and leafy vegetables largely. Those are the things which contain the mineral foods in an assimilable form, and contain roughage, and contain vitamines in quantity and do not overload the system with a lot of things that Nature has to encumber herself to get rid of. On such a diet monkeys, at any rate, have excellent teeth and bones.

AT WHAT AGE SHOULD REGULATIONS BE UNDERTAKEN?*

Some Fundamental Problems

By Luis Subirana, D.D.S., Madrid, Spain

I DO not claim that I am bringing forward an original solution in experimental biology in connection with such an important point in orthodontia.

My sole aim is to offer some ideas suggested by practical experience, and the arguments for and against such views.

I also hope that, as a practical result of this paper, this Congress, after duly discussing the question, will arrive at some scientific conclusions which may serve as a guide to those who practice dentistry and as a standard in orthodontic work.

I should like to state that the accepted belief in scientific circles and amongst leading orthodontists that regulation should always begin with the slightest irregularity in the deciduous teeth and when the six-year-old molars have appeared, does not seem to me to be correct. This is the view which seems to be held in all good faith in the higher circles of orthodontia, contrary to the common theory in other branches of dentistry, arising sometimes out of ignorance, sometimes out of an error of judgment, that regulating should not begin until the permanent teeth have erupted, that is, from the age of thirteen and upwards.

As we are all orthodontists here, I need not waste time in attempting to rebut this last theory.

Is the first theory correct? I think that at any rate it is a matter for discussion.

I would point out that malocclusion is not a disease but an irregularity in an apparatus so varied in its morphologic and functional characteristics, in its position and above all its date of eruption, that there can be no hard and fast rule for it as in general medical practice, which orders immediate treatment in the early stages of the complaint; this rule, although malocclusion is a deformity of the human anatomy, cannot be invariably applied in orthodontia, because circumstances may present which modify it.

Characteristics of composition, the morphology and physiology of the bony structure, could be brought forward as arguments in favor of immediate regulation, since it is a known fact that the cells of the bony tissue have the greatest power of reaction in early youth. But the correction of an irregularity of the deciduous incisors at the age of three—apart from the fact that no child would stand the treatment—would be out of the question at that age, since the deciduous molars which would act as a support to the appliance have not yet erupted.

*Read before the First International Orthodontic Congress, New York City, August 16-20, 1926.

The question of dental statics could be used as an argument in favor of beginning treatment without delay, as well as the fact that the dental system is a system of organs which depend on each other for their general equilibrium, and it is necessary, as soon as any irregularity appears, to correct it quickly so that it may not lead to others. But in this case, as in the first mentioned, the orthodontist is guided by the date of eruption.

If the teeth in both dentitions, that is, the deciduous and permanent, made their appearance simultaneously, we should be able to lay down a hard and fast rule that regulating should begin when the key teeth, the six-year-old molars, are sufficiently erupted to bear the orthodontic appliance.

But man, in his present state of evolution, presents to us this phenomenon of growth in a very diffeernt way from that which we would choose as practitioners, and the only thing for us to do is to abide by it.

There is an interval of six years between the age of six when the first permanent teeth appear and the age of twelve when the cycle of eruption is complete with the appearance of the canines and the second molar teeth, a lapse of time during which the orthodontist is at the mercy of the vagaries of the normal occlusion of the teeth.

I should like to make it clear that in my practice I have not proved conclusively that a treatment of the deciduous teeth at the age of five has a sure preventive effect on the permanent teeth; if this were so, there would not be the slightest doubt that the age of five would be the best at which to begin regulating the teeth.

As I am anxious in my practice to follow the wise saying that "prevention is better than cure," I have sometimes, but not often, regulated the deciduous teeth. In no case have I attained my object, that is to say, to help the permanent teeth erupt in their proper position by providing sufficient space for them. I have invariably had to continue for a long period, even up to the age of twelve or thirteen, in order to turn round an incisor or a premolar, or to push a canine at the last moment, and one has to recognize the fact that the period between five and twelve years of age is enough to tire the patience of a child, its parents and the orthodontist himself, not to mention the results on the health, the teeth and the gums of wearing an appliance for such a length of time. Time is a prime factor in therapeutics, and a solution must be found of this fundamental question in orthodontia. If one does not already exist (unknown to myself), in my opinion it would be an honor for this First International Congress, after careful consideration, to fix a standard which would be a benefit to science and to humanity.

I grant that man, regarded materially and from a biologic and medical veiwpoint, is so varied and complex in nature that it is impossible to fix a definite standard on any desired lines; whether conservative or opportunist, the staff of a clinic should not hesitate to depart from the generally established view when faced with an exceptional case.

I do not think that the cases in which regulation of the deciduous teeth is necessary will be numerous, neither will there be many cases in which, after having regulated the deciduous incisors between the ages of three and four, one may count with absolute certainty on not having to correct the perma-

nent teeth. If there were any such certainty, then treatment should not be delayed. But as a rule, with a few exceptional cases, I am of the opinion that these delicate teeth should not be interfered with.

But, at the age of six, the four first molars appear, and at seven they have completely erupted. Is this the right time to act? In the great majority of cases, no, because we know that there is a much larger percentage of Class I (Angle's classification) than of Class II and Class III, and only in some special cases, in which the mesiodistal relations of these big molars are altered, is correction indicated.

At the age of eight the occlusal surfaces of the incisors appear and at nine they are firmly established in the gums. Should regulating begin at eight? No, to my thinking this is not the best time. Between the age of eight and twelve there is a period of four years, and I consider that any delay in commencing regulation of the teeth is beneficial, provided it does not mean letting matters go from bad to worse and that if carried out it would not obviate the necessity for orthodontic work later on.

At the age of ten the eight premolars appear and at eleven are fully erupted. Should one begin at ten? I consider that the orthodontist has now entered upon an unfavorable period; he has already lost time without gaining any benefit whatever; the first molars have settled down in their places; the incisors have had time to establish themselves firmly in their faulty occlusion.

The second molars and the canines appear at the age of twelve; the position has become even worse; it is complicated by the amount and extent of the work to be done; it is late in the day.

As may be seen, in the period of six years which lies between the appearance of the four key molars (six-year-old) and the canines (at twelve) there is a psychologic moment which is extremely suitable, both from the mechanical and chronologic viewpoint, which the orthodontist should be able to pick out.

My experience in the course of practice has shown me that this period is from eight and one-half to nine and one-half years of age.

At the age of eight and a half the anchoring molars have their roots almost formed; the eight incisors are half erupted, with a tendency to grow out of place, although this defect has not become firmly pronounced. Mechanical action applied to the eight molars which are not strong may quickly react favorably on the premolars which have to take their place, and there is the right time to prepare the proper space for the canines to occlude perfectly.

As will be seen, my tendency is in the direction of postponing the time for orthodontic treatment, provided of course that this delay does not make the trouble worse.

A band round a molar is never good and sometimes harmful, for we must not lose sight of the fact that the enamel is less vulnerable than Nasmyth's membrane, and no matter what care is taken, if the band is kept on too long it may cause an injury, which is the forerunner of caries. For this reason, I often use the second deciduous molars as a support, although I have to con-

clude the treatment with putting fresh bands round the permanent six-year-old molars at the age of eleven.

To those members of the dental profession who, sometimes out of ignorance, sometimes for more unworthy reasons, tell their patients to wait until the age of thirteen or fourteen before having their teeth regulated, as then the dentition is complete, we would say that it is one thing to correct a malocclusion which has become an established fact and another to regulate teeth which are on the way to become faulty in occlusion.

Before making a categoric statement it is necessary to make one exception: the loss of a deciduous tooth through accident or caries at the age of four or five might throw the whole set of teeth out of their proper sequence; it is necessary to take precautions against this fatal misfortune, and a simple appliance for keeping the space for the lost tooth free is absolutely essential in order to avoid worse consequences.

CONCLUSIONS

1. It does not seem to me correct to apply to orthodontia the general medical principle that treatment should commence in the early stages of any disease, since malocclusion is an irregularity and not an illness, and the circumstances surrounding the period of eruption override any medical axiom.

2. There are two views in the general realm of practical dentistry—that of the odontologists, who advise waiting for the complete eruption of the permanent teeth; that of the orthodontists who advise immediate treatment when malocclusion has scarcely appeared. The first is incorrect; I contest it. I do not share the second view and should like to discuss it.

3. Certain characteristics of the bony structure and the question of dental statics could be brought forward as a reason for prompt treatment, but to my way of thinking, these must be subject to the exigencies of the period of eruption.

4. In my own practice, attempts at preventive treatment of malocclusion of the deciduous teeth have not been successful, but I have always continued to be bound by the particular position in which the different teeth happen to erupt and have had to acknowledge the great importance of time in corrective work.

5. My own clinical experience has shown me, after duly weighing the pros and cons, that the best age is from eight and one-half to nine and one-half years of age.

6. In choosing this reasonable age it may be said that the orthodontist is not going to regulate a supposed irregularity (age of five), or an irregularity which is well established (thirteen to fifteen), but a trouble which is on the way to become more serious.

DISCUSSION

B. Frank Gray, D.D.S., San Francisco.—I am very glad Dr. Subirana has brought this subject to the attention of the First International Orthodontic Congress. I am sure it would be a very great help to orthodontia if we could formulate a rule as to the proper time for commencing the treatment of malocclusion of the teeth. I am convinced, however, it is not

practicable to designate any time that will meet the requirements of all cases. A multitude of contingencies enter into the consideration so that we shall have to continue to rely upon our experience, good judgment and discrimination. I do think we can profitably review and discuss this matter and arrive at some conclusions that should be most helpful.

I agree with the essayist that the "slightest irregularity in the deciduous teeth" is not a sufficient indication for orthodontic procedures, nor does the eruption of the six year molars necessarily mark the proper time to commence corrective operations.

I am entirely convinced there is still too much *theory* on this subject which the experience of many workers in orthodontia does not prove to be well grounded. The essayist very aptly calls attention to the nature of dental irregularities, citing the wide variation in the time of the eruption of the teeth, and noting that malocclusion is not truly a disease but an "irregularity in an apparatus varied in its morphologic and functional characteristics," etc. A due appreciation of this would doubtless tend to limit the number of cases of very young children for whom we would think it wise to fit appliances to the teeth.

The case must be rare indeed when orthodontic treatment of a mechanical nature is wisely undertaken for a child of three or four years of age. But I think it most desirable to have children of this tender age under the occasional observation of the orthodontist in order that suggestions may be made to the parents with a view to guarding the child against thumb or finger habits; against faulty sleeping postures or other abnormal stresses that may have an untoward influence on the development of the denture. The orthodontist may also counsel with the parents as to the diet and general prophylactic condition of the mouth.

At six years of age the child may, in certain selected cases, be treated to its great advantage. Surely I believe in cases of distoclusion (Class II Angle) or mesioclusion (Class III Angle) the sooner these malrelations are corrected the better because of the general influence they have on the development of the permanent denture as well as on the face and jaws.

Shall we treat every child that fails to show satisfactory "growth spaces" between the anterior deciduous teeth from four to six years of age, or in whom the measurement between the maxillary second deciduous molars at the gingivopalatal aspect does not exceed 28 mm. Some much respected orthodontists contend in the affirmative. I am inclined to believe, however, that only the most seriously underdeveloped dentures at this age should be placed under the usual routine treatment, and then with the explicit understanding with the parents that it is purely a preventive measure that is being undertaken. It should be made entirely clear that in all likelihood a second period of treatment will be required some years later on.

And here I would stress the unwisdom of keeping the denture restrained by various orthodontic appliances over the whole period of development—between six years of age and the tenth or twelfth year. I think that not nearly enough discrimination is used in the matter of treatment of the deciduous denture, and that very possibly as much or more harm than good may be the result of ill-advised orthodontic interference. An unusual order of skill is, in my opinion, required to do real justice to the treatment of very young children.

Doctor Subirana mentions eight and one-half to nine and one-half years of age as the proper time for commencing orthodontic treatment. There is much to commend the selection of this immediate period as being the most desirable one, and he has elaborated many of the reasons. I shall add one very important one, i.e., the fact that so many of the cases we are called upon to treat show a lack of vertical development in the molar and premolar region, and I think there is no better time for the treatment of this condition than during the eruption of the premolar teeth. The first permanent molars are brought to the proper vertical development—the premolars follow as a matter of course, down to the occlusal plane or horizontal plane that the molars establish in their corrected relation. Thus with the minimum amount of retention the orthodontic correction is maintained in the most normal, efficient and permanent manner.

While I like the idea Dr. Subirana has advanced that this Congress shall set down some specific rules for the general guidance of dentists and orthodontists as to the proper

or most acceptable time for instituting corrective procedures, and since I think our problems are too divergent to come under any one rule,—I will therefore suggest as follows:

1. Cases of distoclusion (Class II Angle) and cases of mesioclusion (Class III Angle) should be treated at the earliest age within reason—certainly as soon after the eruption of the first permanent molars as possible.

2. In the vast majority of cases the most favorable period for treatment is from eight and one-half to ten years of age. Treatment at this period contemplates the correction of all deflections of incisors and erupting premolars, and as stated above, is a most satisfactory time for correcting lack of vertical development in the molar region. Any deflection of the canines may be attended to as treatment of the case is being brought to its conclusion.

3. The dental profession, as well as the medical profession, should be encouraged to suggest that the very young children may have the occasional observation of the orthodontist so that advice may be given as to deleterious habits of fingers, lips or tongue, mouth breathing, and general prophylaxis of the mouth. Faulty posture or pillowing habits may be detected and possibly corrected, while well directed exercises for improving the musculature of the mouth may be given.

In certain cases of greatly retarded development of the deciduous denture a "preventive treatment period" may be inaugurated at the age of five to seven years. This treatment period should not exceed two years in duration, including "retention and observation."

Finally I would emphasize my belief that orthodontists are deluding themselves and their clientele in promising so much from treatment of many cases at the early age of four to 7 years. Aside from cases of distoclusion and mesioclusion, which I have especially excepted, it is almost a foregone conclusion that a secondary treatment period will be required, or that the child will be kept under desultory orthodontic treatment for a period of five or six years, which may be harmful to the child. While it is impossible to formulate specific rules in this matter, a general recommendation along the line of his suggestions should prove most helpful. This should at least cause the orthodontist to give most serious thought to the case in hand before placing it in the class of exceptions to the rules laid down, and in case of doubt he might do well to seek the advice of trusted confreres before deciding to proceed with the treatment.

SOME CASE REPORTS AND THEIR BEARING ON DIAGNOSIS*

By Axel F. Lundström, Stockholm, Sweden

FOR some time past our orthodontic technic has been very efficient. With a few exceptions, which are too well known to require any special mention in this audience, it has been possible for the operator to perform any orthodontic operations that seemed indicated. But it seems to me now to be pretty generally conceded that in a rather considerable percentage of cases the immediate results are far from permanent.

The attainment of so-called normal occlusion, which for many years was a universal aim in the treatment of malocclusion, made a strong appeal to the best side of many a conscientious operator's character. To restore to harmony disfiguring abnormalities was something extremely attractive. And as men readily believe what pleases them, these operators have been very hard to convince that the foundation of their practical methods was wrong. Accordingly, when through hard and cruel facts this was brought home to them, attempts were made to explain why in certain cases the results were so at variance with the fundamental theory.

Several factors have been suggested to explain this annoying difficulty to maintain results as abnormal lip and tongue function, insufficient functional stimulation, abnormal outer pressure, "pillowing habits," etc. These explanations do not regard the objective and methods of the modern technic as faulty in themselves. They only claim that the treatment has been incomplete, and must be assisted by increased function, breaking of the abnormal habits and removing the causes of external pressure. It is not my intention to discuss these theories now, I would only say that in spite of the interesting and important material that has been published it is as yet too early to definitely make clear the different effects of these agencies.

But we also find a trend of opinion claiming that the treatment suggested has been faulty, depending on a misunderstanding of the character of the malocclusions. The advocates of this opinion consider that the diagnosis has been based on inadequate data, and ought to comprise more than it has contained.

Although opinions may differ regarding details, we are probably willing to agree in this, that the aim of all orthodontic activity is to give the denture the greatest possible efficiency, and also, to place it in the most favorable position in relation to the surrounding regions. Of the two schools of thought in orthodontics, the school of occlusion has deserved a lasting honor in laying stress upon the former side of the problem, while the school of dentofacial orthopedics is to be given due credit for its emphasizing the importance of the position of the teeth as regards the facial appearance. Both have accused each other of being narrowminded.

*Read before the First International Orthodontic Congress, New York City, August 16-20, 1926.

They have, however, one characteristic in common. In diagnosis both limit their examinations of the case to be treated to the *status presens,* and consider themselves able to recommend the best treatment on the basis of such an examination. They resemble each other also in this, that both of them set up, so to say, a pattern or a model of a more universal character and try to remodel the denture after this ideal or place it in a position considered as anatomically correct, so that the final effect corresponds with the ideal of the respective doctrine.

For a long time the school of facial orthopedics did not apparently gain much ground among practical orthodontists; at least its methods of practice had very few advocates in current literature. In later years the fundamental principles of this school appear to have come to the front, a considerable amount of work having been done during attempts to give the principles a more scientific foundation through exact investigations.

As is well known, the opinion that it is possible to direct the growth of the maxillary and mandibular bases by means of a specific interlocking of the occlusion, dominated our literature for many years, and apparently many modern textbooks and a number of modern writers take the same view, although several authors and certainly many practitioners are now convinced that its truth is limited. Its advocates fell into the error of exaggeration, and assumed that a certain ideal occlusion, into which the teeth actually could be placed in practically all cases, produced a next to universal success in that the surrounding regions adapted themselves into harmony with this ideal position of the teeth.

But also the gnathostatic systems are based on the conception of an ideal, assuming that the teeth ought to be placed in definite relations to certain planes in the skull. Even if it can be proved that in anatomically perfect cases the sagittal position of the denture is uniform we are not entitled to draw the conclusion that the same positions in relation to the planes in question are to be attained in abnormal cases. If, in our mind's eye, we divide the head into two regions, one consisting of the region on the dental side of the apical plane, and the other comprising the remaining portion of the head, then, in diagnosing a case of malocclusion according to the gnathostatical system, it will be necessary to regard the part of the head on the cranial side of the apical plane as anatomically perfect, and the alveolar section as a purely local anomaly, although resting on an otherwise normal base. Before we start a treatment with as its objective a correction in relation to topographically definite planes inside the nondental region we must have satisfied ourselves that these planes have a correct cranial position, that is to say that the anatomic region, on which the denture is resting, is, will develop into, or may through the influence of some kind of treatment become anatomically correct. The diagnosis according to any of these systems must therefore be preceded by another diagnosis ascertaining the peculiarities of the mandibular and maxillary bases.

The basis for diagnosis and the objective of treatment of the normal occlusion school was the normally occluding denture, to which the surround-

ing regions were supposed to accommodate themselves. The gnathostatic school considers the cranial region as a stable base for diagnosis. In cases of malocclusion the teeth are to be placed in a correct relation to this anatomically correct base. The results of the treatments of the school of occlusion stand or fall according as the normally occluding denture is or is not followed by normally developing surrounding regions. Results of gnathostatically planned treatment stand or fall according as the mandibular and maxillary bases are or are not normal. If the malocclusion is an anomaly, locally restricted to the denture, the gnathostatical diagnosis will present a reliable starting point for treatment. But if the malocclusion is not this, being instead a manifestation of an anomalous condition of the apical base, visible in the denture, then it seems probable that a diagnosis, starting from something that in itself deviates from the anatomically correct condition, will be unreliable, and the results of the treatment dubious. If, indeed, in cases of "normal occlusion" any uniformity can be ascertained as to the position of the denture in relation to topographic points in the skull, then gnathostatic diagnosis will be reliable only in cases of malocclusion with normal basal regions, that is, in cases where as a rule the difficulties are for the most part technical and certainly only in rare exceptions of a diagnostic character.

But these cases do not as a rule present any considerable difficulties to modern orthodontics. Thanks to the advances made in mechanical treatment, devised and elaborated by men whose names are well known to us all, they are generally handled without difficulty. The really troublesome cases are those, in which the base, on which the alveolar process rests, is abnormal, and the causes are unknown, or in which it is not possible to affect this region by means of present methods.

I will now describe a few cases, in which the treatment did not attain the desired results. Evidently the diagnosis must in some respects have been deficient, the operator having overlooked some fundamental peculiarity of the cases in question. These cases will make clear that our diagnoses ought to contain data which as yet have been lacking.

CASE 1.—Fig. 1 shows a case of "Class II condition," complicated by a crowding in the anterior portions of both arches. The case was treated in the usual way with as its objective, "normal" occlusion, which was also attained, but in spite of a prolonged retention the case relapsed (Fig. 2). A new attempt was made resulting in the condition (Figs. 3 and 4) but the final result (Fig. 5) shows that the orthodontic maximum was practically identical with what had been attained after the first period of treatment (Fig. 2). The course of treatment the patient went through after the stage shown in Fig. 2 was not followed by any improvement.

The question now arises: would a diagnosis based on a gnathostatic examination have suggested any different treatment with a more successful result? The gnathostatic point of view assumes that the region beyond the apical plane is to be considered as something that ought not to be changed in an anteroposterior direction. We will now assume that the gnathostatical examination indicates a distal movement of the maxillary cuspids. This could hardly be effected without the sacrificing of one of the posterior teeth on each side, and a bodily movement of the anterior teeth according to the principles of the late Dr. Case, and a bodily movement of the mandibular teeth, undertakings which are practicable only in published articles in our professional journals. In this case of malocclusion the diagnosis ought to have contained this: the mandibular base is too small in relation to the coronal

curve. From a diagnosis containing this information we would have been able to draw the valuable conclusion, that the improvement to be effected in the position of the maxillary teeth is limited to the amount of malocclusion, connected with the posteroclusion.

Case 2.—(Fig. 6) Anteroclusion. The treatment was conducted in the usual way, with attempts to limit the movement of the teeth to the maxillary jaw. When the retainers

Fig. 1.

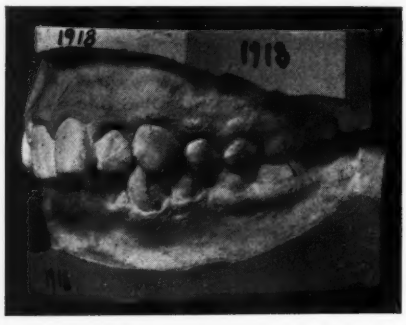


Fig. 2.

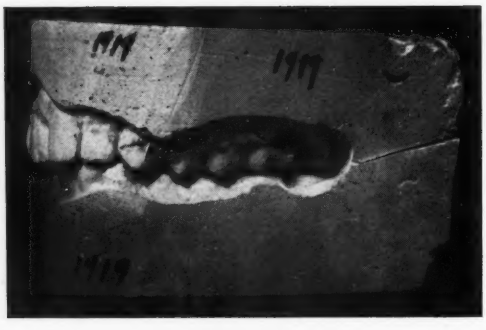


Fig. 3.

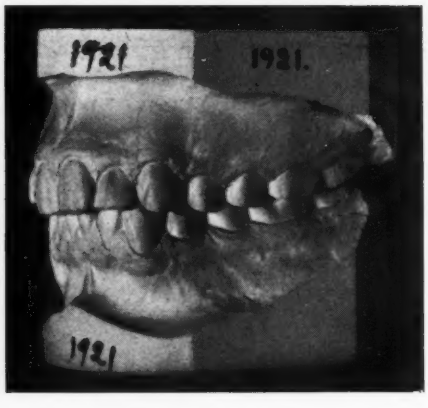


Fig. 4.

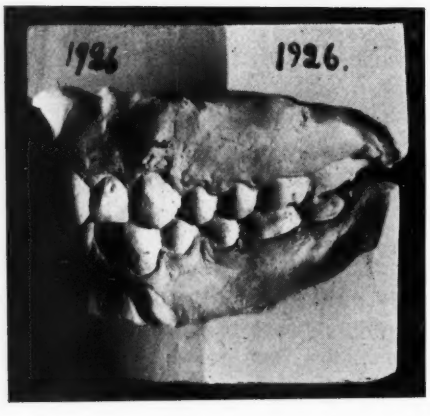


Fig. 5.

were removed the condition was as in Fig. 7. Two and a half years later the mandibular teeth had moved in an anterior direction (Fig. 8). It seems to me that a gnathostatical diagnosis would not have been of any advantage in this case. The essential and all-important peculiarity is the forward growth of the mandibular jaw, which is quite independent of the position of the maxillary teeth. The diagnosis ought to state: progressive forward growth of the mandible.

How ought we to proceed in a case like this in order to arrive at a correct diagnosis? It is clear that an examination of the present status is not sufficient. In cases of "anteroclusion" examinations must be made periodically, as has been suggested by Dr. Lourie in cases of crowding of the teeth in young children, before any orthodontic interference is attempted. At any rate this ought to be the rule in young cases of "Class III condition," unless the malocclusion can be proved to be due to some local factor.

CASE 3.—(Fig. 9.) During the treatment it became apparent that the mandibular arch was in a state of lateral growth, the distance between the first molars having increased

Fig. 6.

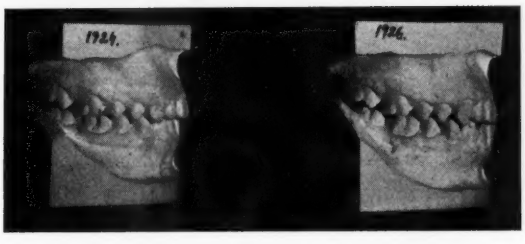


Fig. 7. Fig. 8.

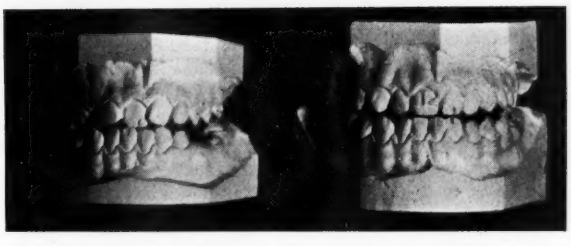
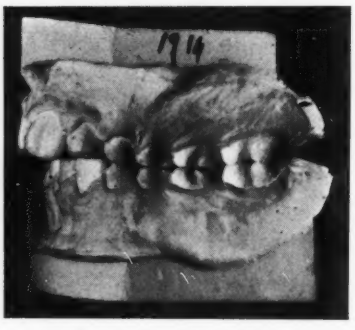


Fig. 9. Fig. 10.

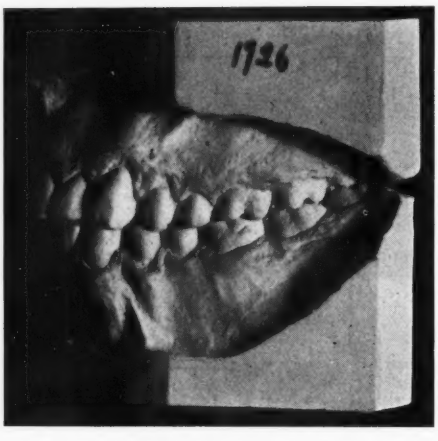
4 mm. during two and a half years. Any attempts to compensate this growth by means of a corresponding expansion of the maxillary arch and a placing of these teeth in "normal" occlusion with the mandibular teeth would have resulted in a disfiguring facial deformity. To be satisfactory the diagnosis ought to have contained this: progressive mandibular growth, precluding the possibility of correction by orthodontic methods. The only sensible advice that could be given would be to suggest that nothing be done until this growth had ceased. If then the deformity troubled the patient to such an extent as to warrant so serious an operation, he should be referred to a surgeon for resection of the mandible. Some years ago a somewhat similar case was related by Dr. Northcroft. (See INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY, 1922.)

CASE 4.—(Fig. 11). Slight degree of posteroclusion. Very narrow maxillary arch. Mandibular arch apparently of normal width. The patient was twelve years old and according to the usual principles of treatment at that time (1914) that an early age was more favorable than later, attempts were made to expand the maxillary arch and to move the mandibular arch into correct anteroposterior relation with the maxillary arch. On account of the very slow eruption of the permanent teeth and one of the cuspids being impacted, it was not before four years after starting treatment that the fixed retainers



Case 4. Fig. 11.

Case 4. Fig. 12.



Case 4. Fig. 13.

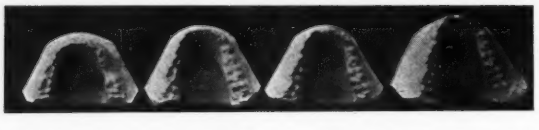


Fig. 14.

could be removed. The patient was then given a removable retainer for the maxillary arch, but soon discontinued wearing it. No removable retainer was inserted for the mandibular teeth, as the mandibular arch was considered as normal in itself, the only change necessary being a forward movement to correct occlusion. The condition at this stage is shown in Fig. 12 and would have been diagnosed as "normal occlusion." A reexamination two years later revealed a rather remarkable change. The width of the mandibular arch, measured between the first molars, was 4 mm. less than the original condition, and a crowding of the incisors had taken place. Six years later, when the patient was twenty-four years old, the change had progressed 2 mm. in the same direction (Fig. 14). The

distance between the first mandibular molars had consequently diminished as much as 6 mm. during the time elapsing from the patient's twelfth to his twenty-fourth year.

If we compare the stage at the beginning (Fig. 11), with the condition shown in the last model (Fig. 14), we find that the object of the orthodontic treatment was not obtained. The diagnosis had been confined to a stating of certain dimensional conditions, which in reality were, as the history of the case clearly demonstrates, in some details temporary, in others progressive. The diagnosis of the condition shown in Fig. 12 would have read "normal occlusion." In both stages (Figs. 11 and 12), the diagnosis lacked a very important datum, viz., an expression of the developmental tendency. The diagnosis was not what it ought to have been, a penetration into the character of the malocclusion, being instead limited to a mere description of the temporary condition. The development of the case, manifested in an irresistible demolishing of the orthodontic result, demonstrated clearly, that *something was happening* in the basal regions of the jaws. It would have been of great importance, if the operator at the time of the first examination had been able to foresee what was going to happen, or even only this, that *something* was going to happen which would make the final result totally different from what was anticipated in the beginning of the treatment.

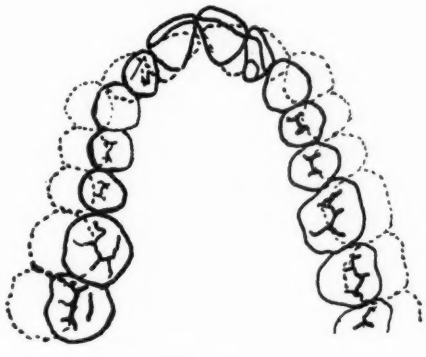


Fig. 15.

Fig. 16.

In planning the treatment of this case no attempt was made to determine the "correct" position of the teeth in relation to the skull. The expansion and the other tooth movements were executed with the intention of expanding the upper arch so as to correspond in width with the lower arch, and the latter was moved forward so far that the lower molars seemed to be in normal relations with the upper molars, the position of which later was considered as in a correct position.

The question may be asked, whether or not some kind of geometrical calculation could have facilitated the understanding of the character of the case and of its developmental tendency. Fig. 15 illustrates the difference between the width according to the arch predetermination of Dr. Pont and what actually could be effected. It does not seem possible that any knowledge as to the sagittal position of the denture would have helped the operator to more accurately foresee what was going to happen, as the dominating character of the case, the *remarkable growth tendency* in the basal portions of the jaws could not have been discovered by any such method of examination. Fig. 16 shows the difference in width of the mandibular arch at twelve and twenty-four years of age.

When very young the patient was considered to be suffering from rickets. Later x-ray examinations of the whole skeleton did not confirm this, the only anomaly detected being a difference of 2 cm. in the length of the legs. It was a pronounced case of *leptorhinie* with a deviation of the septum in an anteroposterior direction. The type of the face is leptoprosopic. This latter character is considered as a family type.

The three cases just described illustrate clearly that mistakes can be made as to the character of the malocclusion if the diagnosis is based on an examination of a momentary condition and ignores the occurrence of changes in the basal region sufficiently active to frustrate the effect of the orthodontic treatment. Unlike the cases to be described later they have one characteristic in common.

For a long time past writers on orthodontic subjects have made a distinction between two classes of agencies causing malocclusion: local and so-called constitutional. Although it must be admitted that our knowledge concerning the nature of these causes is very limited, this division is very useful if we only keep in mind its provisional character.

An orthodontic reasoning, which in prescribing a treatment, argues as if these anomalies were of a purely local character, or regards them as results of pathologic or other factors which have ceased to be active, has, of course, hardly any need of assuming the existence of other than local causes. Under the influence of such a mental attitude orthodontic activity would be inclined to limit itself to a local attainment of the familiar ideal, and ignore any "constitutional" peculiarities. But the history of the cases described clearly shows that it is often necessary to know something more about those factors that are connected with malocclusion of the teeth and evidently are strong enough to derange the improvements in the occlusion attained by artificial means; that the problem of occlusion is of a very complicated nature, also as regards the treatment of these conditions, and that we must take into consideration not only the manifest occlusion but also the "constitution" of the patient.

It seems as if the difference in the final results of similar orthodontic treatment of cases, which our present clinical methods of examination are unable to distinguish, indicates that there must be some fundamental difference. Whether or not the old medical term "constitutional" is suitable in this connection is another question.

According to R. Koch, the conception of constitution is now so interwoven in diagnosis and treatment that it forms an integrating part of these later conceptions. Hufeland is cited as having declared, that diagnosis is knowledge of the patient and insight into the disease. During the period in the history of medicine preceding the specific era of natural science much importance was attached to the characteristics peculiar to the patient, which seemed to exert a great influence upon the progress of different diseases. Immediately following the discovery of pathogenic microorganisms, special importance was attributed to the results of bacteriologic and serologic researches. These researches drew attention away from the patient, his special peculiarities and manner of reacting, and gave rise to the conception of a "disease *per se*." But it was soon discovered that this conception was not of any universal application, and that it was not possible to get along without taking the predisposition into consideration, as evidently in a biologic sense identical germs in different cases had quite different effects.

A further development of the meaning of the term constitution was effected by Martius. "According to his nomenclature the cause is in the organism itself, in whom pathologic phenomena arise under the influence of certain exciting causes. When these exciting agencies are present the patient will be taken ill, provided he is in a certain condition. This condition is the constitution (Koch)." During the period immediately preceding, the term "constitution" had been synonymous with individual condition.

If we now regard the individual condition as something unreservedly characteristic of a certain individual, and if it is, as regards jaw formation, the destiny so to speak of this individual to develop some special variety of malocclusion, then we may be entitled to call the cases just described constitutional malocclusions. If, on the contrary, we accept the views of Martius and give the term constitution the meaning of a certain state, into which the individual may come, although not necessarily destined to do so, then our present limited knowledge must prevent us from using this term.

It not being permissible to use a term in an obsolete meaning, and as we are unable to find one that closely represents what we wish to express, but are in great need of a term embracing these malocclusions, we must be content to use a more vague term. Several such terms have been suggested on different occasions, causes of "irregularities of the teeth" having being divided into "natural and accidental" (Sigmonds, 1825), "general and local" (Colyers, 1900), "primary and secondary" (Herbst, 1922). Several objections can be made against the terms comprising our described cases. The latter terms: accidental, local, secondary, represent in a better way those causes of malocclusion, which have deranged the results of the treatment of the cases to be described later.

A diagnosis, which ascertains a deviation from some ideal, whether this ideal is limited to an anatomically correct denture regarded separately, or in some definite relation to the skull, may also result in a wrong treatment if the causes of the malocclusion are of a more accidental nature. In diagnosing a case it is therefore of great importance to not overlook these accidental factors.

These are of various kinds, but of especial interest as influencing the results of orthodontic treatment we may regard the loss of teeth in the mandible. As yet we have no comprehensible, detailed and complete account of the modifications in the development of the mandible resulting from loss of teeth. Although at present I do not possess sufficient data for any noteworthy contribution to the solution of this problem, it seems to me we can observe two phenomena as more or less direct results of the loss of mandibular teeth, one of these results is the impossibility of correcting posteroclusion with the use of "Baker anchorage," the other is a gradually occurring secondary overlapping of the maxillary front teeth.

Lately, in connection with the gnathostatic diagnostic method, the statement has been made that in a number of cases of "Class II-condition," the maxillary teeth are to be regarded as being in a too anterior position, the mandibular teeth being in a correct sagittal position. At present we will not

discuss this possibility, but assume—which assumption may be correct also according to the advocates of gnathostatic diagnosis—that we have before us a case of "Class II-condition" with the upper arch in correct position and the lower in a too far posterior direction. What is indicated here is, also according to the gnathostatical diagnosis, an anterior movement of the mandibular arch.

I have often attempted to accomplish this movement in cases with mandibular bicuspids lost or congenitally missing, but cannot recall a single instance in which the attempt was successful. A diagnosis based on geometric methods may perhaps contain a certain abstract truth, but in the class of cases we are now discussing such a diagnostic method must totally collapse,

Fig. 17.

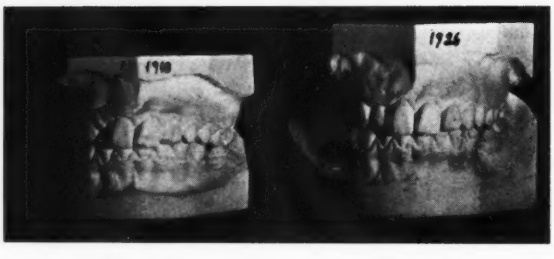


Fig. 18. Fig. 19.

because this kind of "diagnosis" is far too incomplete. It has not taken into consideration something, which the diagnosis according to R. Koch ought to contain, viz., that *something is happening with the patient.*

Case 5.—The case illustrated in Fig. 17 is an instance. Whatever our opinion may be as to whether the maxillary arch is too far forward or not, the impossibility of moving the mandibular arch forward will force the operator to make a compromise treatment consisting in the removal of certain maxillary teeth and a backward movement of the teeth anterior to the space. This could be effected without complications as the apices of the maxillary front teeth were at the start in a relatively favorable position.

Case 6.—(Fig. 18.) Ignorance as to the future result of early losses of permanent mandibular molars effected a faulty treatment. A bicuspid on the right side was extracted as it seemed impossible to permanently place the lower arch into correct occlusion. Six years later it was found that the changes in the mandibular arch due no doubt to the loss of

the molars had caused a secondary effect in the position of the maxillary teeth (Fig. 19). The position of the left maxillary lateral seems to indicate that an extraction also of one of the left maxillary bicuspids probably would have been best.

The cases described demonstrate the importance of duly considering, when diagnosing cases of malocclusion, the changeability of the region beyond the apical plane. But now we have to answer a very important question: how are we to ascertain the developmental tendency in a given case of malocclusion? It seems to me that we must answer with regret that our knowledge concerning the developmental disturbances of the face is very limited, even if we decline to go so far as to include the etiologic factors. Before we can with any reasonable prospect of success discuss these factors we must have a clear understanding of the anatomic manifestations of symptoms. Our first object would then be to work out an accurate description of the development of different types of malocclusion from the earliest possible age. We would surely be able to gather much valuable information from such studies.

The majority of us have in our possession records of a number of interesting cases, which can be made still more valuable through additions of models representing the conditions many years after treatment. The value of such case reports is much greater than what we usually find published in our journals. It must be considered inexcusable that orthodontists possessing such records have not taken the trouble to publish them. It was by no means uncommon in past years that the adherents of the so-called "New School" with badly concealed delight exhibited samples of the results of treatment executed by operators who had resorted to extraction. These latter methods were branded as unscientific as contrasted with what the writers themselves used. But to the true scientific spirit this belongs also: not to omit anything that will contribute to the discovery of what is true and the announcement of the same. If only a fraction of the available material had been studied and described we would now have been in a far better position to take into consideration the real nature of the malocclusion in a given case, that is, what is going on in the jaws and associated bones.

Extensive examination of malocclusion cases by means of plaster impressions, etc., is a very troublesome undertaking. Periodical examinations, confirmed by models, of the malocclusion tendency of cases, which have never been treated, are not so easy to perform. As my cases here reported demonstrate, there are developmental factors, which seem to be very little influenced by mechanical treatment. If every one of us with a number of years experience would hunt up some of the patients he has treated, and secure models of the final results, very valuable material could soon be collected. Several distinct types of malocclusion connected or not connected with specific facial types would probably be established, and concerning which we would know more than we now do, about their different ways of responding to mechanical treatment.

DISCUSSION

Dr. Henry C. Ferris.—Dr. Lundström has presented a scholarly review of theories of diagnosis actuating the thought of today, and has presented examples of failures in practice, common to most every practitioner with any extensive experience, where the normal occlusion operation has not been carried to completion in the three dimensions, and the physiologic condition has not been taken into consideration. (Figs. 1, 2, 3, 4, 5, 6, 7, 8.)

I will here show a treated case with no special attention given to the third dimension. A boy, aged thirteen years, underweight, chronic constipation; salivary and urinary acidity

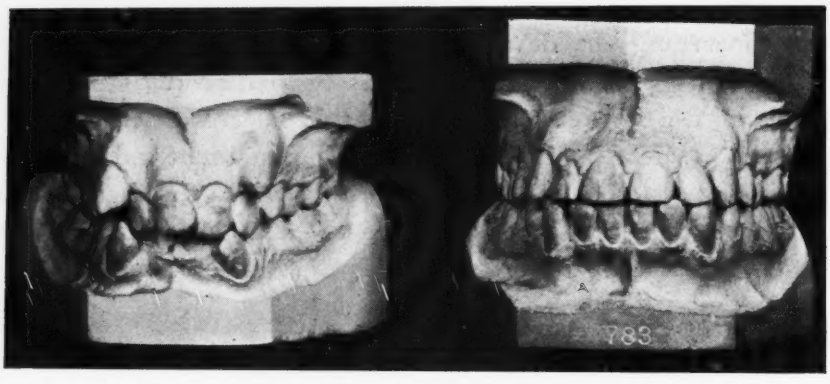


Fig. 1.

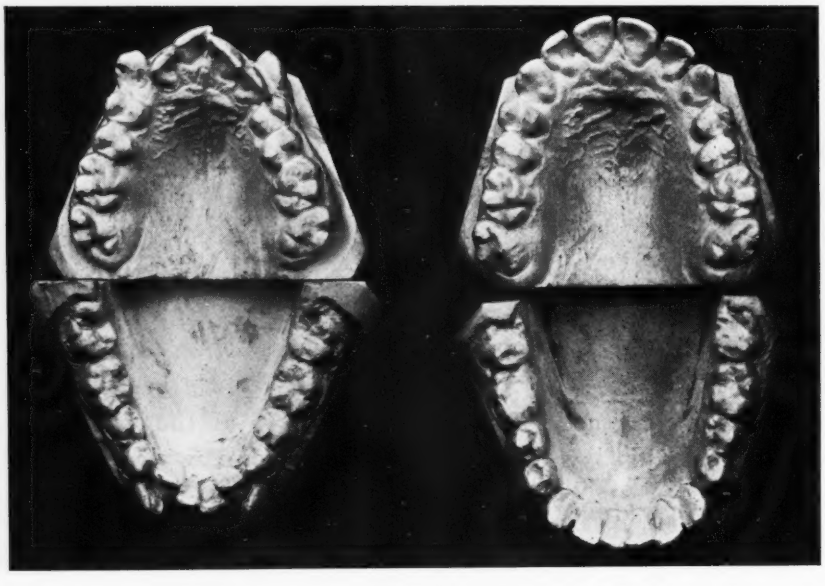


Fig. 2.

and urea abnormally high. The correction operation was accomplished in eighteen months, when it should have consumed three years. Five years later this occlusion was maintained, but through no fault of the operator. Subsequent growth failed to produce any particular improvement in the facial lines, as photographs illustrate. This is a case where retreatment was decidedly indicated.

I agree with some of the essayist's conclusions, but my conception of the vital question is based on a decidedly different theorem. Fundamentally, it must be acknowledged that theory of growth of the human head in its regional chronologic development has not been scientifically proved by the anthropologist or anatomist.

The anthropologist has been able to give us the maximum and minimum length and

width of the dental arch and the three forms occurring in all races of man, and they have proved that arch forms do not parallel the cephalic index of the skull in any race in normality.

The anatomist has shown from usual average measurements of approximate ages, the development and cessation of development of different regions chronologically. The work on the mandible being the most positive, and the work on the nasal and maxillary bones, more theoretical. Their final conclusion being that all bones of the face until late in life, grow downward and forward by relativity, and that function is the greatest stimulus of development to accomplish the highest potential.

Fig. 3.

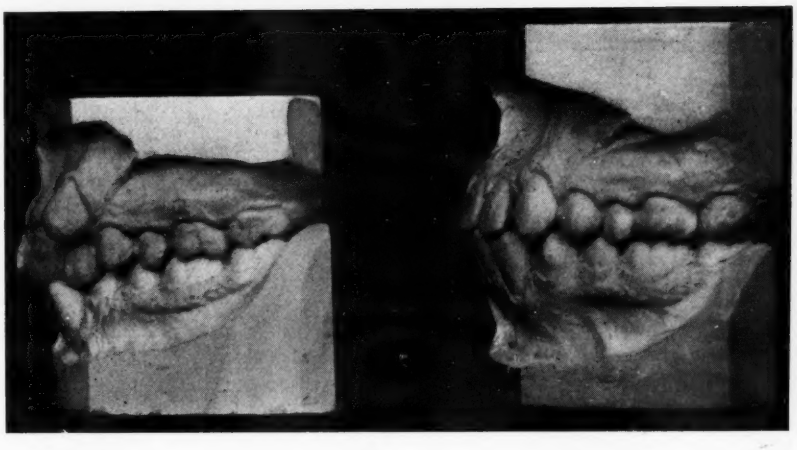


Fig. 4.

The physiologist, endrocrinologist, and pathologist present a complex picture of the influence controlling body growth, such as the hormone stimulation, diet, hygiene and inherited stigmata. These factors cannot be eliminated, as they transcend all others under our consideration.

To state that the bones of the cranium develop normally in the majority of cases, can be challenged by measurements taken of the growing subject's head with a comformateur, and photographic sections externally, and with radiographic records internally.

Fig. 9 shows comformateur records of some prominent Americans, which appear to present bilateral and unilateral deformities, and it is stated by the Knox Hat Company that 60 to 70 per cent of their customers require their hat bands shaped by a mechanical machine for comfort.

Figs. 10, 11, 12, 13, 14, show records of my own face and head which confirm my

previous statement. The maxillary and mandibular arches were mutilated at 10 years of age by the removal of the two first molars on the right side, supposedly to relieve the crowding of the maxillary incisors. Note the effects of disfunction on the bones of the head and face.

Fig. 15 represents a conformation of a patent hat band to supply the demand of the public for relief for this recognized defect in symmetry, and you can note how it conforms to the conformation of my skull.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

The majority of cases of malocclusion actually show unilateral development with a retarded potential in all dimensions of the bones of the head and face on the defective sides, if congenitally grown, or mutilated early in the developmental period. If these statements are accepted, we are without a basis for measurement as to regional development from which to build any positive conclusions or classifications of malocclusion.

Until a craniometer is developed, which is capable of measuring chronologically developmental changes, we are not justified in establishing a diagnosis of a malocclusion of the teeth from any unstable point or plane.

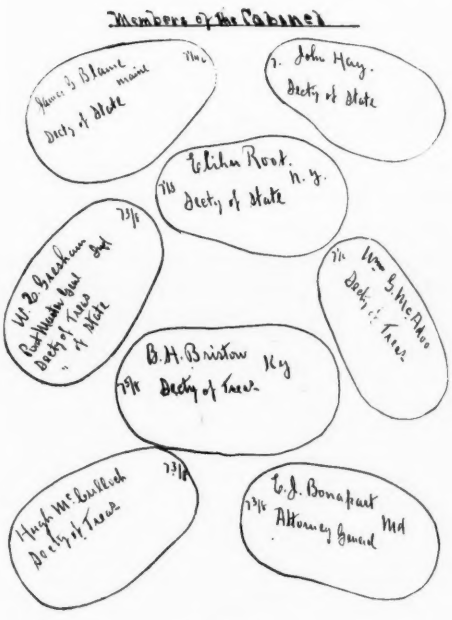


Fig. 9.

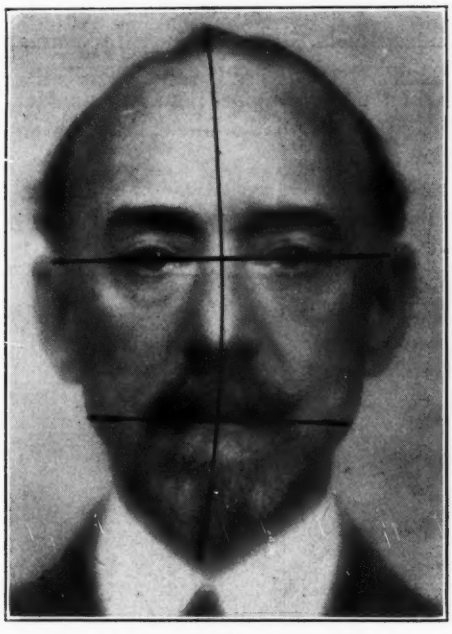


Fig. 10.

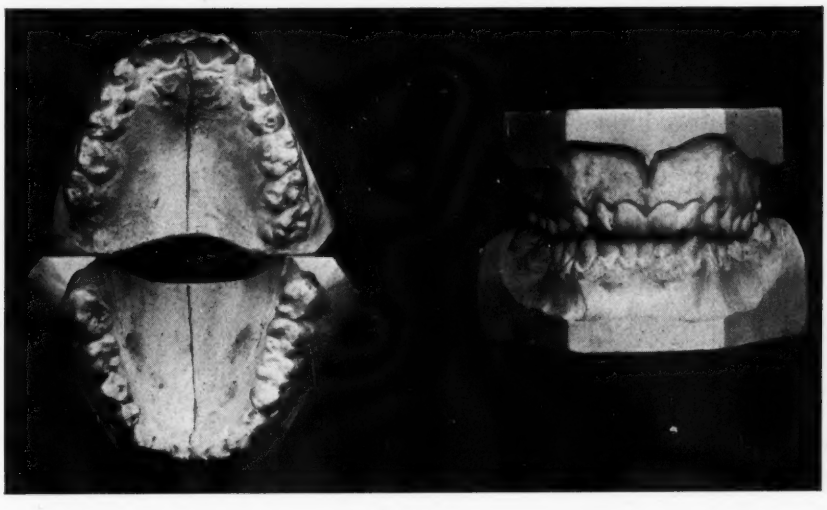


Fig. 11.

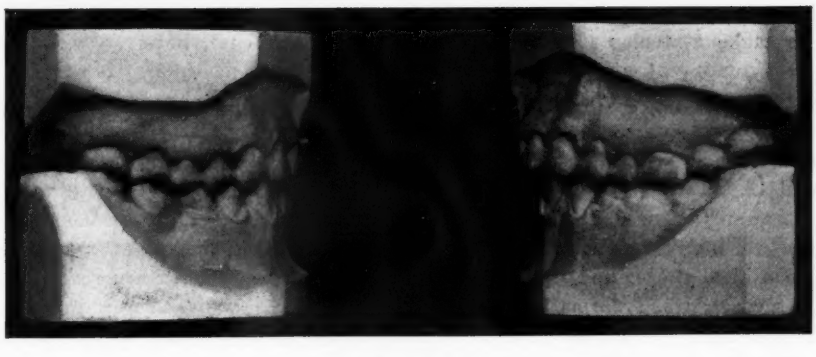


Fig. 12.

For example, in division cases of Class I, II, III (Edward H. Angle), the first maxillary molar on the apparently normal side has been considered the pivotal point upon which to rotate the entire denture when this tooth may be shown to be upon the side of the skull underdeveloped; and in another instance, the first molar may be anterior to its normal position to the whole head, owing to premature extraction of the second deciduous molar.

Experienced practitioners, reviewing case history, reconstruct these positions in their mind's eye, before making their diagnoses. Again, the normal angle of the ascending ramus of the mandible may differ with types in the same race, and a difference of 3 mm. anteroposterior between the maxillary and mandibular sets of teeth may change the classification. Only by a full knowledge of these facts are we able to accept any diagnostic theory other than as an aid in study.

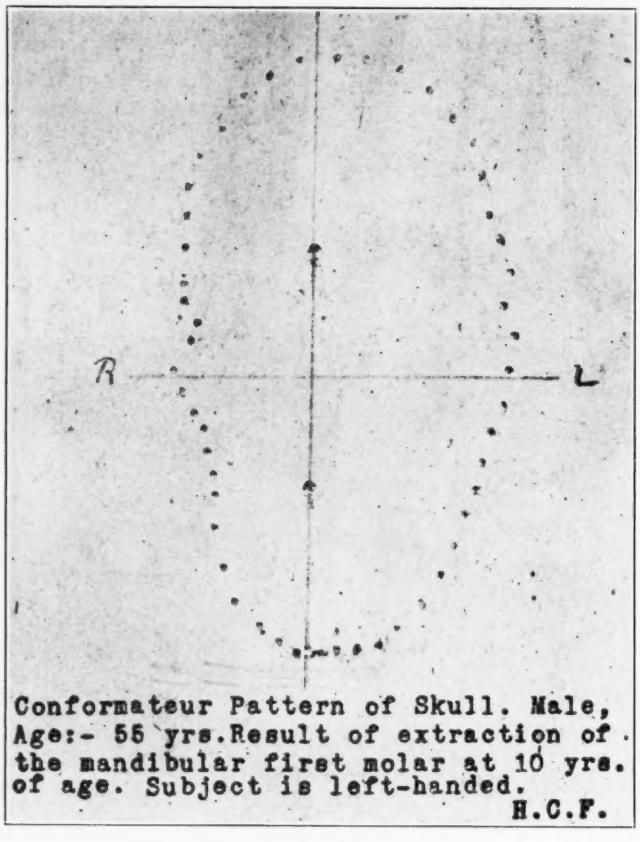

R
L
Conformateur Pattern of Skull. Male, Age:- 55 yrs.Result of extraction of the mandibular first molar at 10 yrs. of age. Subject is left-handed.
H.C.F.

Fig. 13.

When a craniometer is developed that registers relative changes in the skulls, we will be able to make statements with more certainty. Each case, however, would have to be treated individually, as any fixed formula, such as presented by Dr. Simon, would reduce all cases to one type of face, even if we consider that the bones of the skull develop bilaterally normal in the largest percentage of cases, which is untenable.

There is, however, one factor left that does not change during the developmental period, and that is the width of the teeth, and the number of teeth with few exceptions. Their occlusal surfaces and the angle of contact of the occlusal surfaces, constitute a normal occlusion when placed on the complementary arches of the length of the tooth material. This is scientifically accepted, and is associated with balanced features of the face in the majority of cases, when normally grown, which represents beauty for any type.

This standard can be more nearly approximated in a study of a case of malocclusion by the scientific engineering methods of Dr. Frederick L. Stanton, which is based upon

a mechanical principle of the least number of squares establishing a centroid; then by relating the map of the malocclusion to the map of occlusion by registration of the centroids and axis, the movements of the teeth will be a minimum (i. e., the sum of the squares of movement will be the least). The teeth can then be mechanically placed to reestablish the dentures for the chronological age.

If the teeth are placed in occlusion at an early age, regardless of their position to the skull, the developmental forces, stimulated by diet, exercise and function, after eliminat-

Fig. 14.

ing pernicious habits, overcome arrested development regardless of the etiology of malocclusion. This is the result in the majority of cases, provided the full complement of teeth is maintained. It must be taken into consideration that the difference between the maximum and minimum width of the maxillary arches of man does not exceed 10 mm. from buccal groove to buccal groove of the first molars; and that the difference in the maximum and minimum height of the maxillary arch does not exceed 13 mm., so that our problem in all tooth movement lies within these measurements.

Exceptional cases with a tubercular, syphilitic, or metabolic history, require treatment until the developmental forces have ceased, and the full set of teeth are in normal

occlusion; and I prefer to trust to Nature's recuperative forces to complete the development, rather than to work upon an unstable standard.

Ten years ago, I adopted the theory in my practice of predetermined arches by a model survey, and have found it invaluable in my effort to reduce malocclusion. A predetermined arch cannot be attained in its entirety until Nature rebuilds the supporting structures; and the length of time required depends upon the system being treated; but it safeguards overtreatment at any age, provided that the three axes of the teeth are considered. It may be necessary to modify the predetermined arch by widening in the molar regions, as the patient advances in years, and normal development is established. This is not an acknowledgement of weakness of the engineering system, but rather our inability to estimate Nature's highest potential.

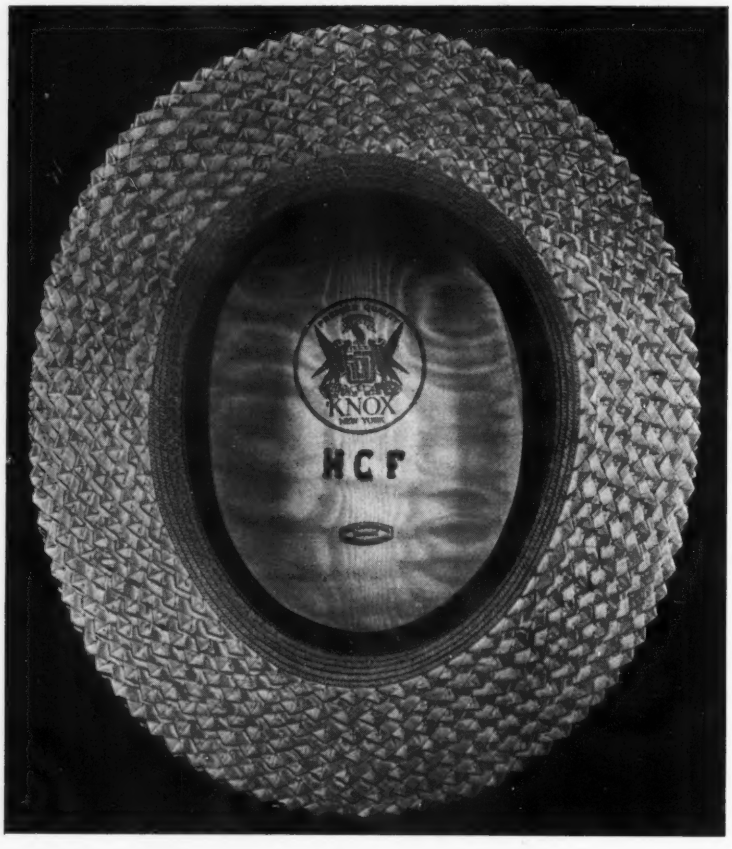


Fig. 15.

I would like to emphasize the fact that we are operating upon pathologic systems, and that our region is in constant motion in abnormal directions. Our field may be a primary or secondary result of a constitutional pathology, but the closer we keep to Nature's normals, the greater assistance will she give our effort. The kinetic forces of Nature are retarded in our region by the mechanical disarrangement of the teeth, and as soon as they are free to act to their normal potential, the sooner do they register the results of our work locally, as well as on the entire physical system.

We fail to stimulate the developmental forces in a percentage of our cases, as do other practitioners in the healing art; but, the greater percentage of our endeavors results in systemic betterment equal to any other treatment known to science, provided we do not mutilate Nature's plan.

Until every effort has been exhausted, the removal of teeth to develop an Apollo type of face in the growing subject, or to save the patient's time and money, is a violation of

the best practice, and should be discouraged. Our highest aim should be to establish a normal occlusion if the measurement of the teeth will permit; that the organ of mastication may support life, rather than try to develop what the patient may consider a beautiful face at the expense of his internal structure.

Many years ago, Dr. Edward H. Angle set forth this fundamental principle upon which our present specialty now stands, and it cannot be defeated.

In conclusion I would say, that my clinical experience teaches me that there is not one point in the growing human head sufficiently stable to be used as a basis of measurement from which a definite diagnosis can be made or prognosis determined.

I further believe that a large majority of our failures are due to a too rapid treatment, and laxity in our consideration of the third dimension or the perpendicular axis of our finished cases during the development period. It is the experience of many practitioners that our carefully treated cases retain their finished position after an expansion of 10 mm.

The plan of growth and development was devised by our Creator, and the recuperative power of the human organization is beyond human conception.

Dr. J. Lowe Young, New York.—I have a few words to say. I have read Dr. Lundström's articles and I know that he is a deep student of development. As I understand his paper, I do not quite agree with him on the question of Class II or distal occlusion cases. I am convinced from clinical experience and also from radiographs that the mandible can be developed if you get the patient early enough. I cannot prove it, but I have found that in distal occlusion cases there is generally ample room for the development of the mandibular third molar where in a very large percentage of the other cases that does not prevail. We are working on living tissue that is growing, and if we bring about the proper stimulation, I am convinced that we do get development.

Now, where the apical bone is decidedly small, I have for years been convinced that we cannot, by applying mechanical stimulation to the teeth, influence the growth of that apical bone.

Dr. Milo Hellman, New York.—Mr. President, I just want to say a few words with regard to Dr. Lundström's paper and they are only with respect to the fundamental value that we may derive by reading his paper; whether it agrees with certain individuals in this world or not, it is certainly based on sound scientific biologic facts.

Dr. Paul Simon, Berlin, Germany.—Dr. Lundström has said that the important thing in diagnosis is knowledge of the patient; this statement is not true. The patient, that means the individual, and diagnosis, if it were knowledge of the patient, i.e., of the individual, is an impossibility, because we never can know the individual. All we know about the individual is the comparison with a normal individual. That is a biologic fact and the first and important work for us is to find this norm, which we can through biometric methods. We will help with biometric methods.

I will say no more about the subject and what Dr. Lundström has said about gnathostatics because my paper tomorrow will treat all these subjects exactly and sufficiently.

President Fisher.—Dr. Lundström, will you close the discussion?

Dr. George W. Grieve, Toronto.—I want to take a minute. I have maintained that the normal trend of the migration of teeth is forward and in many of these cases in the slides just presented the mandibular incisors had the crowns leaning definitely forward. There are a lot of cases where all the teeth have drifted forward in that way, maxillary and mandibular, and they must be carried back. The mandible is undersized. The mandible can be carried forward. That can be done very successfully today.

Dr. B. E. Lischer, St. Louis.—One hesitates to discuss a paper like Dr. Lundström's adversely, for the reason that he has displayed an unusual amount of courage in showing a number of his failures. For a great many years the program committees of the American Society of Orthodontists have frequently said, "Let's get some papers that will show our failures." But they are hard to get. We seem to be afraid to show them, and I want to compliment Dr. Lundström for his courage here this morning. (Applause.)

I agree with him in his conclusions that his original diagnosis, based upon the Angle theory of occlusion, did not give him good results. His cases prove it conclusively. But I do not agree with his criticisms of Simon's gnathostatic methods. He does not show a single Simon diagnosis. I regret to criticize him, but if he had taken impressions, according to the Simon methods, of his cases and made a careful differential diagnosis (which is only possible by that method) his conclusions would be more valuable.

Dr. Lundström.—I have not very much to say regarding what Dr. Ferris said when he opened the discussion. I agree with him in the first part of what he said, but I am not sufficiently good at speaking the English language so that I can quite go into the last part.

Regarding what Dr. Lischer said, he said I was not fair. I think when he reads the paper—

Dr. Lischer.—I have read it, Dr. Lundström.

Dr. Lundström.—I think you do not understand what I mean. The point I want to bring out in this paper is the changeability during growth in a number of cases. A case that at one time seems normal afterwards gets more crowded. I don't see that it is possible at present to find out what is happening through the gnathostatic methods. I regard the methods of the gnathostatic school as very valuable as a means of finding out more about the cases, but it seems to me it is too early to base the diagnosis on that method. I may be wrong and I will be very glad if I am.

ABNORMAL HABITS IN THEIR RELATION TO MALOCCLUSION AND FACIAL DEFORMITY*

By Herbert A. Pullen, D.M.D., Buffalo, N. Y.

A HABIT is defined as "a fixed or constant practice established by frequent repetition." In its larger meaning, it is a quality of the inorganic as well as the organic world, and may be said to be one of the fundamental properties of matter. William James,[1] in his monograph on habit, says, "The laws of Nature are nothing but the immutable habits which the different elementary sorts of matter follow in their actions and reactions upon each other." Thus, the setting of plaster, the change of the crystalline structure of a bar of iron through the action of certain outward causes, or its acquirement of the property of magnetism, are habits of inorganic matter.

James further says, "But the philosophy of habit is thus, in the first instance, a chapter in physics rather than in physiology or psychology." That it is at bottom a physical principle is admitted by all good recent writers on the subject. M. Leon Dumont, whose essay on habit is perhaps the most philosophic account yet published, writes, "Every one knows how a garment, after having been worn a certain time, clings to the shape of the body better than when it was new; there has been a change in the tissue, and this change is a new habit of cohesion. A lock works better after being used some time; at the outset more force was required to overcome certain roughness in the mechanism. The overcoming of their resistance is a matter of habitation. It costs less trouble to fold a paper when it has been folded already.

"This saving of trouble is due to the essential nature of habit, which brings it about that, to reproduce the effect, a less amount of the outward cause is required. The sounds of a violin improve by use in the hands of an able artist, because the fibers of the wood at last contract habits of vibration conformed to harmonic relations.

"Water, in flowing, hollows out for itself a channel, which grows broader and deeper, and, after having ceased to flow, it resumes, when it flows again, the path traced by itself before. Just so, the impressions of outer objects fashion for themselves in the nervous system more and more appropriate paths, and these vital phenomena recur under similar excitements from without, when they have been interrupted a certain time."

In the organic world the acquirement of habits is measured by the quality of plasticity. Habit is a natural phenomenon of living protoplasm. James remarks, "*Plasticity*, then, in the wide sense of the word, means the possession of a structure weak enough to yield to an influence, but strong enough

*Read before the First International Orthodontic Congress, New York City, August 16-20, 1926.

not to yield all at once. Each relatively stable phase of equilibrium in such a structure is marked by what we call a new set of habits. Organic matter, especially nervous tisue, seems endowed with a very extraordinary degree of plasticity of this sort; so that we may without hesitation lay down as our first proposition the following, that *the phenomena of habit in living beings are due to the plasticity of the organic materials of which their bodies are composed.*"

Dr. Geo. Dearborn,[2] in a monograph on the subject, reiterates the following fundamental ideas on habit. "Habit is surely a universal process in matter, in all material mechanisms, whether nonliving or self-repairing, i.e., living. But observe that in organisms its basis is in the matter, not in the mind, so far as we can see. A mental habit at present means practically nothing. * * * It is at present unbelievable that habit in an organism is a mental process. It is matter, protoplasm, that has habit. * * * It has been said that habit is second nature, but William James suggests that habit is Nature herself. * * * So you have in the organism all possible grades of habituation, from the strictly new voluntary movement to the action of the heart or the beating of any other of the rhythmic organs. * * * The basis of the fact that it is easy to form habits, especially bad habits, in the long run is always satisfaction in some way or another. We always get satisfaction, of course, out of the repetition of an act which gives any degree of pleasure, but also out of pain, ideational satisfactions, or out of any other form of will fulfillment whatever, we may get at times true satisfaction. * * * Often the satisfaction derived from a habit is subtle and hard to appreciate, and yet it is none the less effective. In other words, it may be purely physiologic, kinesthetic, or tactile. A neuromuscular habit may be purely kinesthetic, or it may be a matter of satisfaction derived from the pure sensory experience of touching things, perhaps the result of an instinct of an exploratory nature. The dynamic basis of the satisfaction, as of joy, is the kinesthesia of normal bodily activity becoming more and more inhibitory as the child's personality unrolls. A child may do things which promptly lead to fixed habits with any one of these three physiologic suggestions, so to say, behind the movements. Action itself is seen to be satisfaction in this way, and muscle action, at first made by chance, so to say (really developmental practice), may become quickly and fixedly habitual by repetition long before any habit is realized."

In a digest on the phenomena of habit Dr. Leroy Johnson[3] says, "In the organic world the Law of Habit forms a part of the groundwork of life. Every form of activity shows signs of its influence—the moral laws, the intellectual acquisitions, the physical activities of both the individual and the race. This tendency to the repetition of action is agreed to be the cornerstone of the various theories of development, since, with contractility, it is fundamental in organic adaptation.

"This intrinsic characteristic of all structures to repeat activity simplifies movements, makes them more accurate and lessens fatigue. It reduces action to the realm of the subconscious, and makes possible the highly complex adjustments and activities of everyday life. If it were necessary to

consciously guide and control every movement and action of our waking hours we should have time for little else. Thus it is from the fact that an action once performed is more easily done each time it is repeated, that our personalities develop. * * * The phenomenon of habit is a normal manifestation of living tissue, essential to the development and functional activities of the organism. Normal habit movements help to maintain normal structural form. Abnormal habit movements are associated with abnormal structural form. Habit, then, an intrinsic organic force, like all natural processes, is a factor in adaptation which, if perverted in its action, will be as potent an influence in maladjustment and disorganization. A pernicious habit is an expression of a natural phenomenon gone wrong.''[4]

ABNORMAL HABITS AS A CAUSE OF MALOCCLUSION

Many of the simple cases of malocclusion as well as those of a complex character are directly or indirectly traceable to abnormal habits of a neuromuscular nature. Inasmuch as these habits are intimately concerned with the muscles of the face and oral cavity, the lips, cheeks, and tongue, the abnormal forces which are called into continuous or frequent intermittent action have the effect of not only changing the normal form of the dental arch to the abnormal one, normal positions of individual teeth to malpositions, but of causing malocclusions and facial deformities which are characteristic of the particular neuromuscular habit involved. In the respiratory habits the posture of the chest and shoulders may be abnormal and in the extreme we have the typical adenoid thorax.

Thus, it is obvious that the abnormal muscular forces exerted in habit cases are continuous as long as the abnormal habit is continued, and if the latter is not checked in its incipiency, the resulting malocclusion and facial deformity become more and more abnormal as the habit is persisted in, and is related in degree to the force exerted by the abnormal muscular action and the length of time the habit has been continued.

A normal habit, such as walking, is a neuromuscular action, at first rather laboriously acquired by the conscious mind of the child, but in a very short time is relegated to the realm of the subconscious mind under the control of normal habit movement with scarcely any thought being given to the action by the conscious mind. In a similar manner, the abnormal habits, acquired through some sense of satisfaction, are quickly disposed of by the conscious mind, and fall into the subconscious action of normal habits, which accounts for their persistence, and gives a clue to their treatment.

For example, if the neuromuscular action of an abnormal habit can be transferred from the *subconscious* to the *conscious* mind, it can be brought under the control of the will of the individual, which, if strongly and frequently enough exerted, cannot fail to have the greatest inhibitory influence, resulting in the discontinuance of the habit.

Abnormal habits, however, associated with malocclusion are not so easily broken in fact as in theory, so interwoven are they with inherited instinctive tendencies, with psychologic problems of various natures, such as subnormal

mentality in occasional cases, and with such difficulties as a restricted environment, et al. Dearborn says, "The most trivial habit soon becomes implanted so that it is a *part of the organism* even in normal individuals, and where there is any lack of inhibitory control, in a child, notably, who is slightly defective, it will become in the most literal and most obvious sense a part of the organism."

Again, as in the cases of other so-called "local causes" of malocclusion, the action of abnormal muscular habits is not in any correct sense a local or direct cause of malocclusion, the primary cause being complex and remote in its origin because of its dependence upon a nerve reflex or impulse at its inception, although this evolution of habit movement from a reflex is hypothetical. Sherrington[5] says, "All parts of the nervous system are connected together, and no part of it is ever capable of reaction without affecting or being affected by various other parts, and it is a system certainly never at rest. But the simple reflex is a convenient, if not a probable fiction."

CLASSIFICATION OF HABITS ASSOCIATED WITH MALOCCLUSION

The abnormal habits especially associated with malocclusion may be included in three classes: (1) sucking habits, such as thumb, finger, and tongue sucking, the use of pacifiers, and the so-called habit of mouth-breathing; (2) biting movements, such as biting the lips, tongue, or finger nails; (3) posture habits, such as sleeping with one side of the face on the hand or arm.

1. *Sucking Habits.*—The habit of sucking is instinctive with all young animals as well as with children, and, in this sense, is not such a sharp departure from normality in habit cases as is generally thought. The results, however, of sucking the thumb, fingers, tongue, lips, cheeks, or pacifiers as shown by the malocclusion and facial deformity caused thereby, are serious enough to warrant the inclusion of these sucking habits in the class of abnormal habits to be treated as such with as full an understanding of their etiology as can be obtained.

Relative to the causation of sucking habits in children, Dearborn says, "Whatever may be the cause of this habit (and that is a matter of academic discussion of purely theoretic interest), sucking and biting, we may conclude, are almost an innate impulse in humans as in brutes, and are continued from infancy on, and become continuous on the basis of kinesthetic satisfaction when no other satisfaction helps. This is, as near as I can make out, the philosophy of sucking." Freud[6] has made some sensational suggestions regarding the habit of thumb-sucking, as illustrative of all rhythmic sucking habits, holding the opinion that this is one of Nature's means of bridging the sexual instinct from one generation to the next.

Dr. A. Leroy Johnson[7] makes the following interesting observations on Freud's theory, "Notwithstanding the wide difference of opinion among his critics regarding the merits of his work, it is pregnant with many suggestions. And one cannot fail to appreciate his viewpoint that every child is born with instincts which furnish desires and cravings of a primitive nature, and that

these are moulded into energies of value under the influence of a healthful environment acting through a normal nervous irritability. If the reverse is true, then under the pressure of conventional civilization and an unhealthy environment, a hypersensitive nervous system will develop unlimited variations. Habit movements in children are, to an unknown extent, expressive of the conditions of nervous equilibrium in the growing organism."

Fig. 1.—Position of thumb in thumb-sucking habit (median position).

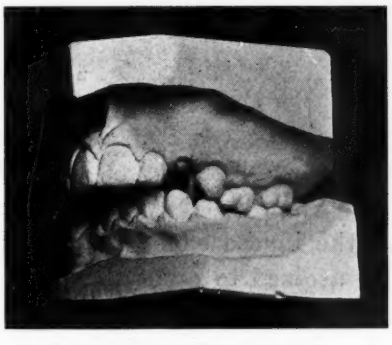


Fig. 2.—Casts of case shown in Fig. 1 illustrating uniform protrusion of maxillary incisors from median position of thumb.

Fig. 3.—Casts of thumb sucker exhibiting labial protrusion of maxillary incisors and lingual displacement of mandibular incisors.

The effect of the habit of thumb-sucking upon the plastic tissues of the face in early childhood is observed in the profile in Fig. 1. This position of the thumb held in the center of the mouth is quite typical of the thumb-sucking cases, and it is plain to be seen that the habit is resorted to without any conscious thought, and yet the child gains more satisfaction from it than from an all-day sucker, so called. The effect of the intermittent pressure continued for a long period of time during child growth upon the dental

arches may be seen in the typical protrusion of the upper labial teeth in Fig. 2. Whereas in this particular case the upper arch is uniformly protruded, due to the holding of the thumb in the median line, many cases exhibit the resulting malocclusion to the right or left of the median line only, according as to whether the thumb or finger is held on the right or left side of the mouth. In any case, the lower incisors are usually lingually displaced by the abnormal pressure of the thumb or finger if the habit is of long duration. Fig. 3 illustrates a case in which considerable lingual displacement of the lower incisors as well as labial displacement of the upper incisors has occurred from thumb-sucking.

In some cases, as in Fig. 4, several fingers are included in the suction habit to the extent of causing a more extensive malocclusion as well as deforming the shape of the hand. The resulting malocclusion in Fig. 5 had

Fig. 4.—Inclusion of several fingers in sucking habit resulting in deformation of hand.

not attained any serious proportions when the case came under my care, although an incipient malocclusion may be noted.

A somewhat similar effect in the malocclusion to that resulting from sucking the thumb or finger is produced by the inadvised or ill-advised use of the rubber or celluloid "pacifier" (Fig. 6) utilized to quiet the restless or crying infant. The anterior portion of the dental arches conforms quite as easily to the form of the pacifier as to the thumb or finger and the malocclusion is fully as extreme.

The most encouraging feature in regard to the thumb or finger sucking habits is that they usually disappear during childhood, even though they persist to maturity in some cases in which no conscious control has been inaugurated, and if continued to adult life, it is difficult and almost impossible to persuade one to give up the habit.

The usual methods of treatment by parents or nurses consist in covering the thumb or finger with some irritating and distasteful substance such as pepper or aloes with the hope that the child will thus avoid the use of the thumb or

finger, but this treatment is usually of little avail. Others have resorted to tying the arm and hand so that it cannot readily be used. Mittens and aluminum balls (Fig. 7) have also been used with indifferent success for the purpose of breaking the habit, the persistence of which usually wears out the patience of parents or nurses using this method. In connection with psychotherapeutic treatment, however, the wearing of these protective or preventive coverings may be of considerable service, in bridging over the sleeping period when the conscious mind is at rest, and the habit predominant.

It is evident that the earlier in child life that the thumb or finger sucking habit can be eradicated the less extreme will be the resulting malocclusion, and the less confirmed will be the habit. As before mentioned, this

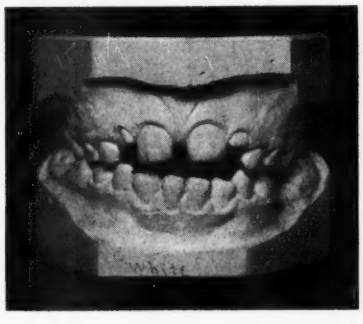


Fig. 5.—Open-bite malocclusion caused by sucking fingers as in Fig. 4.

Fig. 6.—Extreme malocclusion caused by use of the "pacifier" in quieting the crying infant.

habit is controlled by the subconscious mind largely, and an early and persistent attempt to enable the child to gain a conscious control of the habit will have more influence than any of the mechanical methods suggested.

Fig. 8 illustrates a case of malocclusion caused by thumb-sucking, of a child two and a half years of age, in which the protrusion of the upper incisors of the deciduous set is quite evident, but which was treated by suggestion only, pointing out to the child the damage it was doing by continuing the habit. The impression made by this suggestion and supplementary suggestions along the same line from the parents resulted in the discontinuance of the habit immediately, and the restoration of the normal positions of the malposed incisors without mechanical treatment, the normal forces of lip pressure being reestablished and moving the incisors back into their normal alignment.

Even with the aid of psychotherapeutic treatment in many of the incipient cases of thumb or finger sucking, the mechanical treatment of the malocclusion resulting therefrom is necessary. In neutroclusion cases in which the habit is active the restoration of arch form and normal positions of the teeth is comparatively simple if the treatment is begun by six or eight years of age. In distoclusion cases in which this habit plays a part, the treatment is correspondingly more complex, even though the habit responds to treatment as readily as in the simpler cases.

The so-called habit of "mouth-breathing' is related to the sucking habits in the sense that, as Dearborn has stated, "the universally known process of inspiration pneumatically considered is one especially of suction." Mouth-breathing is essentially a pathologic condition in which the whole respiratory system and the entire organism is affected, and, even after obstructions to

Fig. 7.—Aluminum ball and sleeve for prevention of thumb or finger sucking.

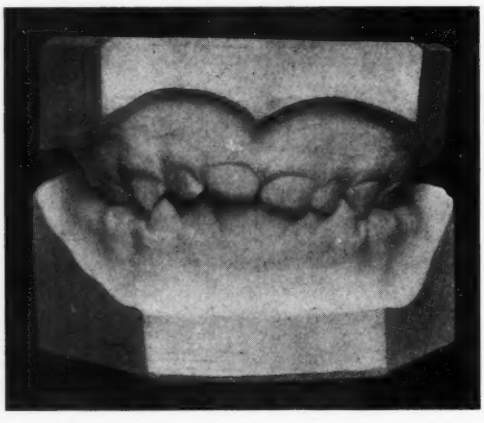


Fig. 8.—Slight malocclusion of thumb sucker, age two and one-half years, cured by psychotherapy.

nasal breathing have been removed, the attempt to inculcate normal nasal breathing is often thwarted by the continuance of the mouth-breathing habit, by the narrowness of respiratory passages, and lack of growth of the internal face, which apparently does not readily develop on the restoration of function. Fig. 9 exhibits a typical mouth-breather in infancy and youth, the continuance of the open, drooping mouth showing the persistence of the habit.

This is not surprising in view of the possible inheritance of the long, narrow dolicocephalic head, and the correspondingly narrow nasal passages, in which cases no amount of therapeutic treatment could be otherwise than palliative of abnormal respiratory conditions.

In any event, the correction of mouth-breathing as a habit must be approached with a full knowledge of all the conditions present in a given case, and with a cognizance that the typical adenoid thorax attitude and flattened

chest observed in many of these cases does not give much assurance of a full and complete restoration of normal breathing habits, normal chest development, and normal facial expression.

The unbalanced mechanics of respiration and occlusion in the case of the mouth-breather, as in Fig. 10, mean that the musculature of the face, neck and chest is likewise unbalanced, and must be corrected or at least partially so before normal breathing habits can be properly instituted.

This offers a problem in kinesitherapy, or the therapeutic treatment of abnormal musculature, by which the scientific restoration of normal muscular action and the harmonious coordination of the muscles of the face and jaws, and associated muscles, may be attained. Realizing that in malocclusion of the teeth, especially in mouth-breathing cases of neutro- and distoclusion, the

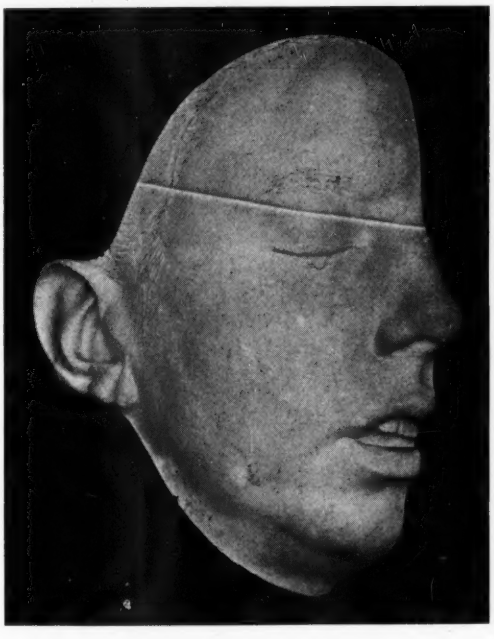


Fig. 9.—Typical face of severe mouth-breather exhibiting open drooping mouth, protruding maxillary teeth, and pinched external nasal meati.

muscles of the face and jaws are susceptible to many disharmonizing influences, Dr. Alfred P. Rogers[8] has suggested such stimulating and corrective treatment in many of these cases along the lines of kinesitherapy as will restore harmony in action and balanced musculature (Fig. 11).

This is done by educating the patient in a conscious control of whatever group of muscles is weakened through disuse, or acting abnormally from any cause, and the use of various exercises prescribed for the development of these muscles during and, if necessary, after the treatment of the malocclusion, during the period of retention. Fig. 12 exhibits the patient before and after the posture exercises for general bodily development.

As illustrative of the habitual abnormal action of certain groups of muscles of the jaws, especially the ptygeroids, the abnormal action of these muscles in the mouth-breather becomes a necessity, but even after the removal of

adenoids or other obstruction to normal respiration through the nose, the disfiguring appearance of the open, drooping mouth, due to the abnormal muscular habits, does not readily disappear, and in many cases requires the most persistent treatment through muscle training in order to obtain satisfactory results.

2. *Biting Habits.*—Although varying somewhat from the sucking movements in habit cases, the habit of biting the lips, cheeks, or tongue is just as persistent, and is likewise instinctive with young mammals. The malocclusions caused by these different biting habits vary according to the lines of

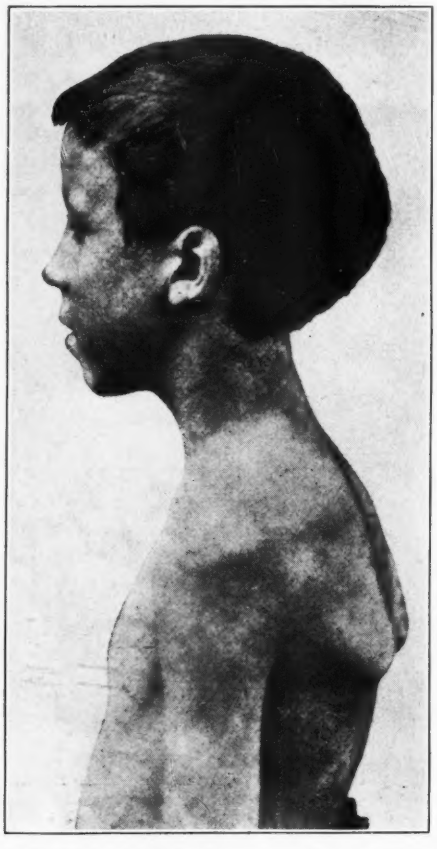


Fig. 10.—Adenoid thorax and attitude. (*Sir W. Arbuthnot Lane.*)

abnormal stress applied to the dental arch, and according to the region in which the abnormal biting force is applied. For example, biting the lower lip between the maxillary and mandibular incisors, as in Fig. 13, causes the maxillary incisors to protrude, and at the same time retards the development of the lower dental arch labially. This is one of the unconscious habits in which we often see children indulge, and a semicircular red ring below the lower lip is telltale evidence of its existence, where there is a tendency to conceal the habit. Fig. 14 exhibits the malocclusion exerted by the habit working along abnormal lines.

Biting the lip on one side of the mouth causes a malocclusion of lesser degree than the full lip biting and on one side only. Biting the cheek, while

not usually causative of a severe malocclusion, will cause a minor malocclusion which cannot be corrected until the habit is stopped.

The type of malocclusion caused by biting or sucking the tongue may result in a permanent open bite malocclusion if the habit is not broken up early in childhood and the incipient malocclusion corrected. The habit of biting the tongue is formed in early childhood and has the effect of depressing the upper

A. *B.* *C.*

Fig. 11.—Kinesitherapic treatment of abnormal musculature of face and neck in mouth-breathing cases. (*Dr. Alfred P. Rogers.*)

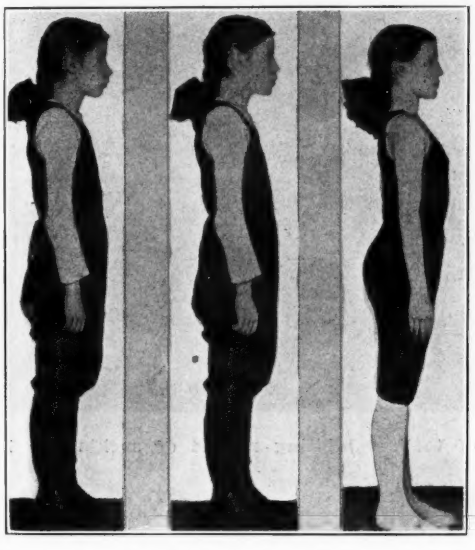


Fig. 12.—Posture exercises for general bodily development in mouth-breathing cases. (*Dr. Alfred P. Rogers.*)

and lower incisors and cuspids (Fig. 15), and preventing them from developing vertically. Dr. James McCoy[9] reports an unusual case of malocclusion caused by pushing the tongue toward the left cheek, and then slowly drawing it back into position, the effect on the dental arch being to bend the left lateral half of the lower arch lingually, the premolars and molars in the lower arch inclining lingually to an extreme degree.

In the attempted treatment of these lip and tongue biting cases by mechanical means, such as the extension of protruding points on orthodontic appliances which will cause pain if pressed upon by the lip or tongue, the results are not usually satisfactory, although they may be of some assistance during their treatment by psychotherapeutic methods in the same manner that the thumb-sucking habits are brought under conscious control of the patient.

Fig. 13.—Typical position in lip-biting case.

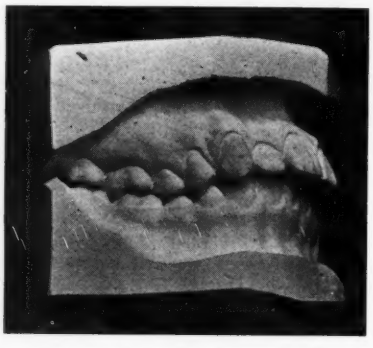


Fig. 14.—Malocclusion of case shown in Fig. 13 of lip-biter.

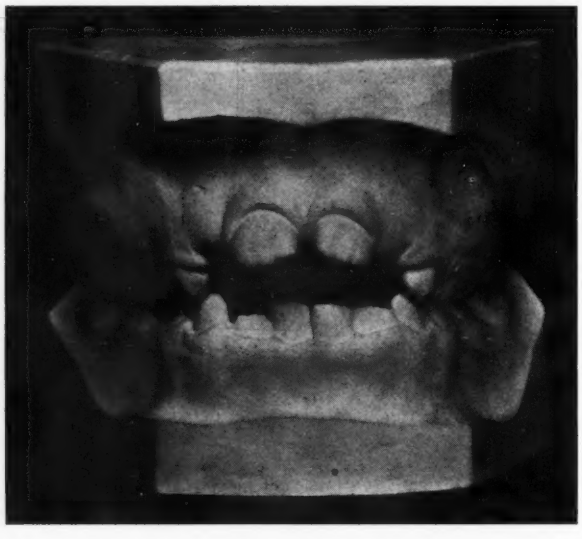


Fig. 15.—Casts of teeth exhibiting results of sucking or biting the tongue.

3. *Posture Habits.*—The third class of habits especially associated with malocclusion may be included under the heading of posture habits, and especially those which are known as pillowing habits, formed in infancy, and which have quite as deleterious effect upon the dental arch as habits of the other two classes described. The habit of a child of lying upon only one side of the face in sleeping, or of pillowing the side of the face upon the hand or arm, or occasionally the shoulder, produces pressure upon the plastic dental arches of the child, causing malformations in form and extent conformative in degree to the particular pressure habit indulged in, and to the length of time the habit has been continued.

These malformations are usually lingual occlusions of one or both lateral halves of the dental arches, according as to whether the pillowing habit is unilateral or bilateral. Fig. 16, *A* and *B*, illustrates the habit of sleeping with the left side of the face pillowed upon the hand, causing the unilateral lingual occlusion shown in Fig. 16-*C*. Dr. Harvey Stallard,[10] from whose article on the etiology of cross bites and Gothic arches Fig. 16 was taken, has made a rather exhaustive study of the pillowing habits of children and suggests that the unilateral and bilateral lingual occlusions of the maxillary arch are caused by these habits.

Dr. Stallard says, "Darkness being prerequisite for sleep has long prevented easy observation of sleeping habits. Nearly all persons sleep at night and it is only within the last decade or two that lights necessary for studying children asleep have been so improved that a study can be made without disturbing the child. It need occasion no surprise that earlier writers have found no relation between pillow habits and malocclusion.

"Careful pediatricians have long recommended that children sleep on a hair mattress without pillows and have advocated frequent turning of the baby to prevent flattening of the cranium. They have also discouraged face-

A. *B.* *C.*

Fig. 16.—Unilateral lingual occlusion (*C*) caused by bad pillowing habit (*A* and *B*). (*Dr. Harvey Stallard.*)

pillowing. It has been found that harmful sleeping habits are less likely to be formed without a pillow and are most exaggerated when large smothering pillows are used. Fewer malformed faces occur in those who do not use pillows. Keeping the infant on its abdomen for prolonged periods leads easily to bad pillowing habits. So far as the denture is concerned, many different postures may be assumed in bed, providing not too permanent pressure be applied to the face, the child breathes through the nose, keeps its hands away from the face, and sleeps without a pillow. It is best to make the child lie straight on the back, then on one side, then the other, pillowing always on the cranium, health permitting. Children should never pillow their faces upon anything nor rest their cheeks upon their hands during the day.

"The determining factor of cross bites, Gothic arches and various stages of bucco-maxillary lingual occlusion leading up to these extremes, is pillowing the face upon hard objects but principally upon parts of the upper extremities. Mouth-breathing is a passive factor and perverted occlusion an allied factor which helps to continue the constriction of the maxilla. The predisposing factors leading to bad pillow habits are slouchy sleeping postures."

It is evident that pillowing habits which are incorrect in posture are more difficult to break than the biting habits because they are formed and continued during sleep when the conscious mind is at rest and cannot exert any control over them except before going to sleep, or during any wakeful moments at night. The other habits which have been described, with the possible exception of mouth-breathing, should respond more or less readily to psychotherapy if properly applied at as early an age as an impression can be made upon the receptive mind of the child.

PSYCHOTHERAPEUTIC TREATMENT OF HABITS

The forcible breaking of a habit by mechanical means is considered a rather violent method of treatment by the neurologist, who believes that the delicate nervous system of the child should not be forced to withstand the strain of suddenly and violently breaking with the habit under compulsion of various kinds. In this respect, Dearborn[2] has this to say, "Many habits, of course, have extraneous pleasure connected with their formation, but intrinsically the process seems regularly to be a subconscious one. * * * On the other hand, the inhibitory kinesthetic strains or impulses are conscious, and when violently opposed may be intensely unpleasant. When the case is one of breaking a habit, the unpleasantness may be so great that in practice it dominates the behavior at the time, and oftentimes, of course subconsciously if not deliberately in consciousness, influences the mind of the individual strongly enough to become a permanent motive, preventing the breaking of the habit. * * * The breaking of a well-fixed psychomotor habit is wholly, for the most part, unjustifiable. A habit is not like the femur bone which may be forcibly broken and in time made to grow again, but, on the other hand, habit is a part of the child's organism, part of his brain action, and his muscle action, ingrained in every part of his mind and body. Too much shock to such mechanism when young deranges it and may set up very serious undercurrents in the nervous system. * * * One stops any child activity at one's peril, unless it be done along Nature's methods. * * *

"The theoretic cure for bad habits is a threefold process of (1) normalizing, (2) displacement (substitution), plus (3) enlightenment, the purpose being displacement. The normal way of breaking a habit, the safe way, is to displace it with something else. The neuromuscular mechanism is far too subtle and sensitive a thing, and these involuntary habits involve too much of a strain, to make it safe to insist that it be broken off short, so to speak. * * * I believe that the average child, even as young as five or six years, can be guided wisely if properly approached along the lines of psychotherapeutics, careful, elaborate explanation adapted to his years pointing out the really fundamental things. A child under such instruction, when it is expedient, can be impressed, or at least his subconscious mind can be impressed so that it would be effective in many of these habit conditions. * * *

"Explaining things to them is the simple enough principle of modern psychotherapeutics, full explanation and, to some extent, sanction of the habit. A child should not be punished nor abused because he has a habit.

but he must be led to understand the human nature of it and must be able to work out his own gradual cure. * * * But one must start with a normal, that is, an outdoor, nervous system and musculature. * * * I certainly would not try to 'break' a habit as such; but it may safely and surely, most often, be bent and persuaded out of its wrong growth. * * * To this end the surest road in the long run, it seems to me, is vigorous biologic normality, busy normality, as I have called it. Try to make the child normal by natural hygienic means, and keep him usefully busy with natural out-of-door muscular distraction, for this kind of fatigue leads to much sleep, sound and deep, that may be called out-of-door sleep, whether indoors or not. Anything which tends to nourish the nerve centers will tend to lessen all these tendencies toward habitual exaggeration of any one movement or kind of movement."

Summing up some of the more salient points of the paper, it may be stated that:

1. Habit is a normal manifestation of inorganic as well as organic life, and in the latter is a natural phenomenon of protoplasm.

2. Habituation to the extent of abnormality is the repetition of a natural action to the extent of perversion.

3. Habits which cause malocclusion can be readily diagnosed and classified, thus rendering them more readily understood.

4. The malocclusions caused by various habits are related in degree to the severity of the habit, and the length of time the habit has been indulged in.

5. Abnormal respirational habits are of a slightly different order of habits, and are, because of their constitutional nature, very difficult to cure.

6. Habits, which are ingrained in the organism, should not be violently broken, because of a possible shock and derangement of the nervous system.

7. Psychotherapy offers the best means of treatment of habit cases, but requires the cooperation of the child, the parents, and the orthodontist.

8. Kinesitherapy, or the correct training of weakened and abnormal muscles in habit cases, is a valuable adjunct to psychotherapeutic treatment.

In conclusion, let me say that the treatment of habits of a malocclusional nature gives one an insight into human instincts and predispositions, into factors of heredity and environment, which have much to do with human welfare. These factors have their bearing upon the building up of the more pleasing characteristics of the child, with the inhibition of those which are undesirable, and in the attainment ofttimes of a pleasing personality as a result of well and intelligently directed efforts at self-control, which should be the aim of every individual.

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DISCUSSION

Dr. F. M. Casto.—The study of habits seems destined to occupy an important place in the solving of orthodontic problems. Dr. Pullen's masterful discussion brings out many significant phases of the subject and indicates the necessity for a closer and more exhaustive investigation.

The orthodontists have generally, in the past, placed too little importance upon the influence of habits as related to cause and effect. Some of the most bitterly fought battles in an effort to correct malocclusions have been contested on the common ground of abnormal habits. Sometimes these battles rage over a period of years, without either the orthodontist or the patient gaining any particular point of advantage. During these struggles the orthodontist may use every artifice, every strategy, every measure at his command —psychology suggestions, an appeal to pride, kindness, severity, everything, and yet, it all avails but little, if anything.

One might say dismiss the case, discontinue the orthodontic interference, why worry when there is no apparent cooperation, why assume any further responsibility? Such procedure admittedly would be the easiest way out for the orthodontist, but what of the patient? And then it would be an admission of failure and the problem would remain unsolved.

Probably my experiences have not been unlike those of many other orthodontists who have had patients with whom abnormal habits, had become so thoroughly implanted, so much a part of their lives, that to break them was almost impossible.

I recall quite vividly several patients who had become strongly addicted to the habit of thumb, finger, tongue or lip sucking that in attempting to correct the malocclusions, the practice of orthodontics was not only made burdensome but almost impossible. Some of these patients persisted in the habit irrespective of anything and everything that humanly could be done. It is needless to say that the malocclusions were corrected several times and conversely, the arches were as frequently distorted. Such unusual cases as these, for they are unusual, present real problems and bring the orthodontist to the realization of the fact that more than a superficial study of habits is necessary.

Dr. Pullen has developed his subject beautifully and his discussion of it is sane, logical, impressive and convincing. He has shown us that habits are an innate quality of the human organism, that they are a natural phenomenon of living protoplasm, that they are with us and an integral part of our lives, whether good or bad, from birth to death, that they are inherent and acquired and that their complete elimination would be fatal.

One is reminded of that old adage about women, "You can't live with or without them." Summing up the proposition it would seem that the human behavior is controlled and dependent upon habits. This seems to be a glaring fact whether we like it or not. It is agreed among a certain group of scientists that life is a purely biologic and chemical equation, and that the only reason for its continued existence is that the cells of which the body is composed possess the qualities which enable them to make satisfactory adjustments and adapt themselves to environmental conditions, and the ability to respond to adequate stimuli, thereby conforming to the law of compensation.

The human organism encompasses a greater complex field, responds more generally, more definitely and more acutely to stimuli, than does any other living thing. The human organism also presents a very definite individual problem. It is said that the outstanding fact of evolution is individual variation, which of necessity, must produce individual behavior; this would seem to explain the great individual variation in habits. The instinctive habits as well as those acquired must depend upon the ability of the protoplasm to make

proper adjustments, thereby bringing about a coordination of all factors concerned. The instinctive habits, such as walking, talking, eating, the functional activities of the special senses and others, are, generally speaking, common to all. This also applies to animal life, else why does the dog chase the cat; the cat chase the mouse, the squirrel run up a tree, the rabbit hop, the bird fly or the rooster crow? Instinct, plasticity, response to an adequate stimulus, proper adjustment, and there you are.

The acquired habits of an individual present quite a different picture. The problem is more complex, less understood and more difficult of solution. Those which are necessary to the well being or life of an individual may be called good habits, while those which unbalance or disturb the equilibrium of development and growth and are injurious to health may be termed bad habits. But whether good or bad we seem destined to acquire them. Some are fortunate enough to have the good habits predominate.

Dorsey writes, "we learn new responses for adjustment purposes, and in taking on habits are subject to factors which condition all learning. We become adapted, positively or negatively: the stimulus reaches us more easily or we inhibit it with less effort.

"We begin with no acquired habits, we begin at once to acquire them; with these, to acquire others. But when we get to be mere bundles of habits, when we know, when our mind is made up, when nothing can move us, we are through. We have used up all the blank pages we inherited on which to write our life. Without habits we are in a bad way, as poorly equipped for life as though we have surrendered to habits—then we are in a bad way." It would seem as though life was just one damn habit after another. Acquired habits although usually the result of imitation are nevertheless peculiar to the individual—otherwise why do some children suck the thumb, others the fingers, others the lip, and still others the tongue? This may also be said of a vast number of other acquired habits.

The study of habits in general is interesting, instructive, enhancing and I suppose it must be done in order that a groundwork, a foundation may be constructed upon which to build a structure for a more intense study and investigation of these abnormal habits which are peculiar to our own specialty.

In the absence of definite data I do not know whether the abnormal sucking habits are on the increase or not. I suspect as much. I understand that most all well organized maternity hospitals have instituted a regular hospital routine, requiring that the hands of all babies be covered while under their care. This practice seems to be quite significant. It is distinctly advantageous to prevent an abnormal habit rather than to correct it afterwards. Dorsey writes, "As the weaning day approaches many babies take to the thumbs. The thumb satisfies the sucking reflex, an instinctive act. But if the baby is not allowed to get its thumb in its mouth, the sucking reflex will disappear along with other infantile actions.

"Elimination functions are instinctive and many habit activities are built up around them. Such acts cannot be broken up, as can the sucking reflex, but they can be socialized, and the infant can be taught continence with respect to them very early in life. Habits whether inherent or acquired can usually be broken up by alternating the stimuli. The principle back of breaking habits is the same as that back of forming them—substitution. Substitute another. Sometimes it is difficult. The path may be worn too deep, then it is a habit; if useless, a bad one; if dangerous, lock him up."

Dr. Pullen says that it is evident that the pillowing habits are more difficult to break than the biting habits. If he includes in this statement biting and sucking the lip, biting and sucking the tongue, I cannot agree with him. In my experience the combination of biting habits and sucking habits have been the most stubborn, the most persistent and the most difficult to break. The reasons seem obvious. The lips and tongue are always with the patients and they can suck them at any or all times and whether under the influence of the conscious or of the subconscious mind. In such abnormal habits as these, the protoplasmic adaptations, the plasticity, the adequate stimulus, the inherent influence if any, all seem to be perfectly coordinated and operate with one accord; the neuro-

muscular mechanism is perfect. This is particularly true in many cases of the tongue habits, to correct which, one is soon at his wit's end. Nothing much can be done other than an appeal to the child's pride, and common sense. The result of orthodontic interference in such cases is certainly discouraging.

In some cases of thumb and finger habits I have used with good effect a leather cylinder made to fit the arm loosely at the elbow, extending a few inches above and a few inches below the joint and held in place under the clothing with strips of adhesive tape. This arrangement does not interfere with function, permits the child to use its arms generally but prevents it from putting the hands to the mouth. I have also used cardboard cylinders for the same purpose.

In breaking habits the orthodontist is often called upon to employ every means at his command and not infrequently compelled to send out an SOS.

In dealing with the correction of habits one must not be unmindful of the fact that the human behavior covers a broad and diversified field—that the human organism is a most complex mechanism—delicate, sensitive, emotional, responsive, endowed with inherent qualities and tendencies that may be obscure and difficult to understand, and that the abnormal habits with which we have to cope may be due to an underlying cause far more remote in their origin than we are wont to believe or recognize.

I have enjoyed Dr. Pullen's paper immensely, his presentation was scholarly, the illustrations beautiful and his summary clear, concise, and comprehensive.

Dr. Ferris.—I wish to give you my experience on the subject of thumb-sucking. After some little study of this particular subject, I had a number of cases which gave me a great deal of trouble and I sent out an SOS and found Dr. Daubin, head of the Polyclinic, to whom I appealed. His answer to me was this: Thumb-sucking habits are a symptom of a cardiac disorder. In order to illustrate his position, he stated that if you wished to prove his assertion, take your pulse rate and then swallow a glass of water. Take your pulse rate again. After a short period take a glass of water and drink it sip by sip. Take your pulse rate the second time and you will find that you have raised that beat from fifteen to twenty in count. The gustatory nerve is stimulated by the movement of the tongue.

When we talk for a long period, we become mentally weary for the reason that we have forced our heart to supply our brain with an extra amount of blood.

I utilized that theory and treated a number of cases with a mild heart stimulant such as phosphomurate quinine (?), giving a child a tonic dose after each meal, and it has worked with me very satisfactorily. It think it is worthy of your consideration.

Dr. E. E. Richardson, San Francisco.—It is natural for children as well as grown people to want to do the thing they are denied. That has been proved since the dry law came into effect. I have treated many of these thumb-sucking cases without a failure by making a partial split plate, banding the molars and canines, soldering a heavy wire, to the molar and canine bands, and making a little plate with a little wire "U," and snapping them into position. After they are cemented into position, I take a modeling compound impression, modeling it while it is soft. It will still leave a groove that will snap under the lingual wires. After you have placed this in position, you can tell the patient he may suck his thumb all he wishes. Some children become angered; they feel they are conquered. It seems to lose the effect of bringing the thumb into contact with the soft tissues of the mouth. I have never known this to fail as a treatment.

Miss B. Pool, South Wales.—I am afraid I can't claim originality for what I want to ask. I was surprised to read in the newspaper that the M. O. H. of Manchester had the courage in the face of all the ban on the comforter to say he found a point in favor of it and that point was that when the baby had the comforter in its mouth, it couldn't possibly breathe through it, so I want to ask the opinion of the meeting about mouth-breathing. Perhaps some of the mouth-breathing gentlemen who smoke will tell us whether it is possible to breathe through the mouth and smoke at the same time, whether

it is possible to blow and suck at the same time, and whether one habit will develop out of the other.

Dr. Curtis W. Williams, Shreveport, La.—I wish to send out an SOS to Dr. Pullen. I wish to ask about tongue-sucking, where the tongue is placed in the front part of the mouth and causes an open bite. I have had one or two cases of that and have had no success at all.

Dr. C. E. Byington, Chattanooga, Tenn.—I understand that we are trying to seek relief for these conditions. I have worked out a remedy that is absolutely a specific for thumb-sucking. It came about in a rather homely manner. You know in order to wean a calf, a leather halter is put on it with nails in it and the mother will resist and won't let the calf suck. The idea is to do it by the direct method. Often one has a child under three years of age. I have perhaps a dozen now. The bands are made by direct method. I take a modeling impression and with a 19-gauge wire get it to extend for about 3 mm. free from the incisors and with three needle-like projections soldered to the lingual wire. It will not irritate the tongue and the child is not conscious of it until he puts his thumb or finger in his mouth.

You may have to extend the second wire back into the palate section and make auxiliary wires of 19 to 21-gauge wire to extend into the canine region. The normal lip action is quickly restored and it will work absolutely in every case.

Dr. Pullen (closing).—I am very glad that my paper has appealed so much to the members of the Congress and especially to the ladies.

Dr. Casto has given a very full and able discussion of the subject and has elaborated some points of causation and treatment which I hinted at in my paper. Dr. Casto believes, as do Drs. Byington and Richardson, in the efficacy of mechanical interference in the thumb- and finger-sucking habits. I do not wish to discourage these mechanical efforts at inhibition of these habits, but only to stress their frequent failure. In early infancy, before the teeth have erupted, is the period when aluminum balls on the hands or other inhibitory mechanism is of the greatest service, when the habit is in its incipiency, and not confirmed by much repetition.

The hands must be kept away from the mouth during both waking and sleeping hours if these mechanisms are to do any good, and it is a question, first, as to whether it is not a little severe and cruel to practice a continual inhibition which will stop the natural placing of a baby's fingers in its mouth when it has no intention of sucking them, and second, as to whether it is not impossible to be so constantly watchful of a baby as to entirely prevent the inception of a sucking habit.

Again, it is also because of the frequent failure of the mechanical contrivances for correcting or inhibiting these habits at a later age, such as the sharp projections on lingual arches, etc., which I have occasionally used, that I have stressed the psychotherapic treatment of these habit cases.

In reply to Dr. Pool I would say that it is evident that she does not smoke (and I trust that she does not acquire the habit) or she would have been convinced ere this of the impossibility of sucking on a cigar and blowing out the smoke at the same time unless the cheeks can be used as a bellows independently of inspiration.

Mouthbreathing cases throw little light upon the thumb- or finger-sucking habits as far as causation is concerned. It is my opinion that in the case of the child that sucks a "comforter" in its absence, the finger or thumb is often substituted, but with less satisfaction, and the thumb- or finger-sucking habit might thus develop from the original habit of sucking a "comforter."

I was interested in what Dr. Ferris had to say in regard to cardiac disorders. I must confess it had not occurred to me nor had I been advised of such a situation as might develop under those circumstances and I think the therapy which he has recommended might be worth a trial.

Glass-blowers develop abnormal habits of bulging the cheeks, the muscles conforming to the abnormality. Each of us has certain habits of facial expression, habits of speech

and thought and action. One person may rest his chin on his hands, one may stroke his moustache, continually wrinkle his forehead in a frown, hold his cigar in his mouth at an angle of 45°, shuffle in his gait, etc.

The malocclusional habits in a sense are no different from other habits which are regarded as individual idiosyncrasies by which we distinguish one person from another. We find instances of training the posture of youth and the military bearing, so-called, are an expression of our best posture habits which have been known to physical instructors for many years.

In general medicine we have the posture specialists, and in the sense that he corrects abnormal facial expressions and respirational habits, the orthodontist is also a posture specialist. Normal habits help to maintain normal structural form, and it is the duty of the orthodontist to recognize and counteract by every means within his power the various habits which have been disclosed in the paper.

ESSENTIAL TECHNIC IN THE USE OF THE OPEN TUBE APPLIANCE*

By James David McCoy, M.S., D.D.S., F.A.C.D., Los Angeles, Calif.

THE success of any mechanism is dependent upon its use in accordance with the definite purpose for which it was designed. Not infrequently orthodontic appliances have been advocated, which have been highly successful in the hands of those who have developed them but when tried out by others have not measured up to expectations, due to the fact that those attempting to adopt them have added modifications and changes which nullified their usefulness. Even though these be slight, involving apparently insignificant details, the failure to follow rules laid down by those whose careful experimentation has perfected the appliances often renders their working powers inefficient and brings down upon them unjust condemnation. In no instance does this apply more fully than to the "open tube attachment" and its use in conjunction with the labial arch wire, the combination of these two elements going to make up what we term "the open tube appliance."

This means of tooth movement is not advocated as a universal appliance but is suggested only in those instances where the labial arch wire is indicated and desirable. This method of attachment between the force producing part of the mechanism and teeth to be moved is accomplished through the use of an open tube of special design which receives the arch wire or suitably constructed auxillary springs and securely holds them during the application of force. It further provides for definite degrees of force control; namely, for a rigid, semirigid or nonrigid attachment. This means of controlling tooth movement was introduced many years ago by Dr. Calvin S. Case, but owing to the fact that the attachments were made of nickel-silver and their design never brought up to the fullest possibilities for efficiency, never received any degree of favorable recognition by orthodontists.

*Read before the First International Orthodontic Congress, New York City, August 16-20, 1926.

IMPORTANCE OF PROPER DESIGN AND ALLOY

I have used these attachments since 1907, constructing them at that time in accordance with the methods then in vogue which required that the open tubes entirely encircle the wire. After trying nickel-silver, gold of various karats, platinum and irrideo-platinum, the method was discarded owing to the fact that when the arch wire was unlocked from the grasp of the tubes on several successive occasions the lips of the tubes were either fractured or the bands to which they were soldered were loosened upon the teeth. These objectionable features were finally overcome through the addition of two important features, namely, the design of the attachment and the alloy from

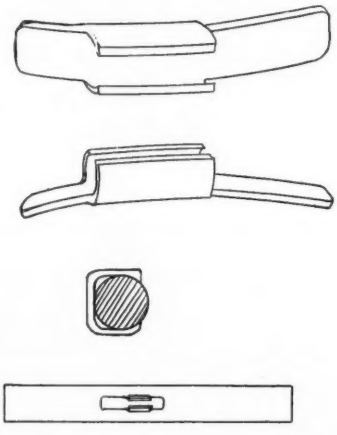

Fig. 1.—In the upper part of the figure a machine made "open tube attachment" stamped from a cross-shaped piece of metal is shown. Two arms extending laterally from the center portion are not of equal length. Both serve to reinforce the band surface and the outer half of the longer one is left unsoldered when advisable and used as a "rotating arm." In the center the grasping principle of the open tube is shown as well as the extent to which it should encircle the wire. At the bottom an "open tube attachment" is shown soldered to a strip of band material ready to be made into a band.

Fig. 2.—"Open tube attachments" soldered to the labial surface of incisor bands and showing the method of using the "rotating arm."

which it was constructed. The problem of this latter element was finally solved through the cooperation of an expert metallurgist* through whose cooperation a precious metal alloy, having a high degree of resiliency, was developed. The change in design necessitated a provision to reinforce the labial surface of the band so that the process of unlocking would not cause it to be distorted or lifted away from the surface of the tooth, thereby breaking the line of cement. In addition to this a provision was made to facilitate tooth rotation. In fulfilling these two requirements it became necessary to make the attachments by machinery. Accurate steel dies were made which provided for the stamping of each attachment from a cross-shaped piece of metal which allows two arms to extend laterally from the open tube after it has

*Mearle W. Wilkinson, E.M., M.S.

been completed. These are not of equal length, one being left longer than the other. This is done so that if a tooth is to be rotated the end of this longer arm may be left unsoldered from the surface of the band and a delicate hook formed for the attachment of a ligature. The ideas involved are shown in Figs. 1 and 2.

In order to utilize this procedure with any degree of satisfaction to the operator it was found essential to adopt a standard size for the machine-made attachment, one size only being necessary for precise and accurate operation. Where handmade attachments are made from strips of metal two objections are encountered. Uniformity is usually lacking in that the strips of metal are not always the same in thickness or width, and the open tubes do not encircle the arch wire to the exact degree essential for efficient holding and easy unlocking. When made of an alloy of proper character the open tube should encircle the wire not more than 75 per cent of its circumference. Anything over or under this endangers the working qualities of the attachment.

DIAMETER OF ARCH WIRE IMPORTANT

Another factor determining the degree of success with which this method is used is concerned with the working portion of the arch wire. This should be 0.030 of an inch in diameter; anything larger or smaller is apt to prove unsatisfactory. This does not necessarily mean that the whole arch wire must be of this diameter; in fact, the threaded ends or such other parts as are used to engage the horizontal tubes on the anchor teeth should be of larger diameter; the writer having found that 0.036 of an inch in diameter is admirably adapted for this purpose.

We have then a labial arch wire with very strong and stable ends supporting a working portion, having a high degree of flexibility and of a size which is delicate and admirably adapted to be received into the open tubes. Objections are sometimes offered to the fact that such an arch wire requires soldering at two points but where a suitable alloy is used this objection does not hold. A round wire for the working portion is better adapted than one which is rectangular for reasons which are obvious to anyone who has studied the comparative uniformity of force control of the two forms.

One of the most important points of technic in using this appliance is concerned with unlocking the arch wire from the attachments. This is easily accomplished through the use of a straight chisel having a long sharp beveled edge, its blade being about 2 mm. in width. By placing the sharp edge beneath the arch wire on the mesial or distal side of the open tubing and giving a sharp pry, the arch wire is unlocked. If a narrower chisel is used or one having a blunt edge, the operation is not accomplished with the same degree of ease. If the arch wire is to be unlocked at several points it is best to start at one side and unlock it in sequence. The ease with which it can be removed and put back in place naturally proves advantageous, not only in making adjustments but is equally appreciated in those instances where breakage has occurred which necessitates appliance removal.

ADAPTING THE ARCH WIRE

In adapting the labial arch wire it should be attached first to one of the molar teeth and then bent around the dental arch, attaching it in sequence from tooth to tooth. With a thoroughly annealed wire this is readily and easily accomplished. By leaving the lips of the open tubes well opened a wire 0.030 of an inch in diameter (the working portion) will pass between them with ease and allow for accurate adjustment. When this has been accomplished the lips may be pressed gently down against the wire using a pair of flat-nosed pliers for the purpose. When seated within the open tubes, the arch wire may be given any degree of rigidity of attachment which is required by compressing the lips of the tubes against the wire. This operation is easily accomplished but should be attended with care and executed with delicacy of manipulation so that no roughening of the edges of the attachments may take place. Upon subsequent occasions when the arch wire has been removed it should, upon being seated back to place, take its place within the tubes with a distinct snap. Where the holding power of

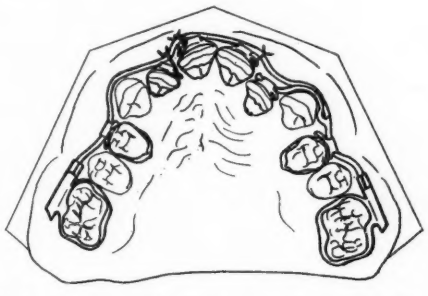

Fig. 3.—The rotation of incisors through the use of contractile silk ligatures and rotating arms on several adjacent teeth.

the tubes seems lacking they may be compressed with the use of a pair of pliers as already explained.

When the open tube appliance is first placed in a patient's mouth, the factor of comfort may be greatly augmented. First, by an accurate adjustment of the arch wire, bringing it as closely in contact with the teeth as possible and allowing it to pass through the attachments without tension, and second, by closing the open tubes only sufficiently to keep the arch wire from slipping out. In other words a nonrigid attachment between the arch wire and the attachment should be established. This will prevent the usual soreness which occurs from the pin and tube appliance or other forms of orthodontic mechanism where rigidity of attachment is unavoidable.

SOLDERING THE ATTACHMENTS

One of the most frequent tooth movements necessary is rotation. This is accomplished with great ease by the use of the rotating arm of the open tube after the plan shown in Fig. 3. During this movement, however, care should be exercised in having the lips of the open tube especially wide apart so that they pass about the arch wire without friction. In soldering the attachments to bands at least half of this rotating arm should be left unsoldered. This can be more easily accomplished through the use of an anti-

flux than by any other means. If those who have tried to use this method have experienced difficulty in soldering the attachments to bands it is because they have attempted to use the free hand method. I mean by this, they have held the band in one pair of pliers and after flowing a small piece of solder at the desired spot have held the attachment in another pair of pliers and attempted to solder the two parts together. This usually results in the attachment being placed at the wrong angle, or in its being too high or too low on the band surface. Whenever possible it should be soldered exactly in the center of the labial surface of the band. This may be accomplished by first, fluxing the center surface of the band and then, after using an antiflux on the inner side of the rotating arm, laying the attachment on the band surface where it is to be soldered. Then using a pair of band soldering pliers with delicate, narrow beaks allow one of the beaks to pass between the lips of the open tube and the other to rest opposite this point on the inside of the band. This holds the attachment exactly where it should be. A very small piece of solder is then laid at the junction of the attachment and the band and the parts carried into the flame and the solder fused. Eighteen karat solder may be used with safety if care is exercised.

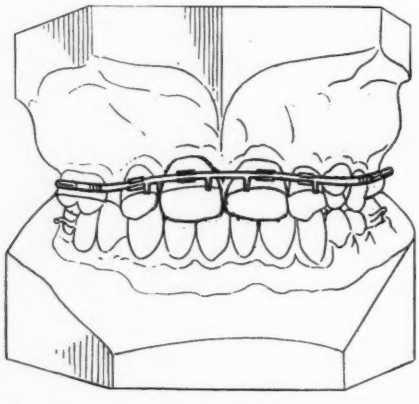

Fig. 4.—Short vertical pins soldered to the arch wire to control the bodily movement of incisors.

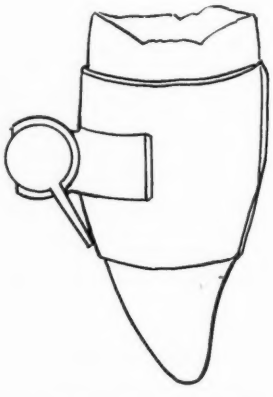

Fig. 5.—Vertical pins should not extend below the edge of the band.

In using the rotating arm metal ligatures should not be employed. Grass-line silk will be found to be very satisfactory for this purpose. When the rotation has been completed no ligature is necessary as the open tube may then be compressed deftly about the wire and the changed relationship of the tooth sustained.

THE USE OF VERTICAL PINS FOR CONTROL

Where the bodily control of incisors or other teeth is desired the use of vertical pins soldered to the arch wire either just mesially or distally to the open tube attachment will accomplish the purpose. These pins should be made of very fine wire, 0.020 of an inch in diameter being suitable. Such pins should not extend beyond the edge of the band to which the attachment is soldered as sufficient leverage from short lengths proves ample. (See Figs. 4 and 5.) By the addition of these pins the vertical relationship of

incisors or other teeth may be definitely controlled. In other words, a tooth under such influence may be moved bodily or the attachment may be used as a fulcrum and the root-end moved labially or buccally and the incisal edge moved lingually. In accomplishing this movement the vertical pin is given a slight bend toward the tooth before the arch wire is seated. In fact, it should come in contact with the tooth when the arch wire is just passing through the lips of the open tube. In such an instance the precaution of slightly compressing the tube or tubes should be carried out lest the spring of the vertical pin have a tendency to render its attachment insecure. Whenever the lips of these attachments are compressed or altered in any way great care should be exercised and rough edged pliers should not be used.

CLOSING SPACES

Where incisor teeth are spaced and must be moved together this is accomplished with ease if the following precautions are taken. After bringing the teeth to approximate alignment the two central incisors are moved to-

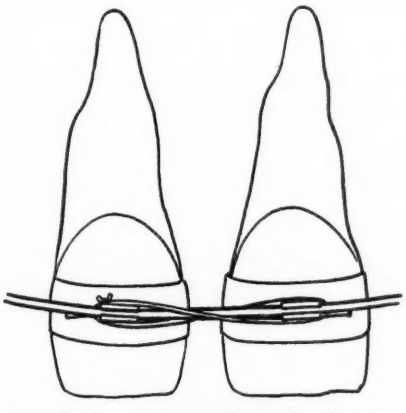

Fig. 6.—Closing spaces through the use of silk ligatures.

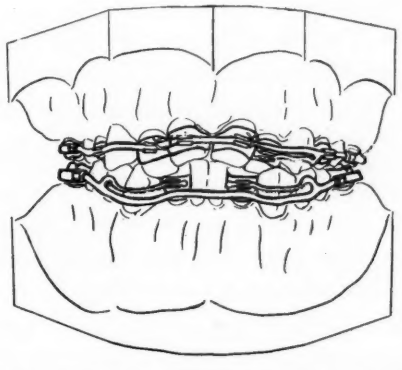

Fig. 7.—Auxiliary springs may be used for the movement of individual teeth.

gether by passing a contractal silk ligature from the distal side of one attachment to the distal side of the attachment on the opposite tooth. (See Fig. 6.) With the contraction of the silk these teeth will slide along the wire their bodily movement being accomplished. When brought to suitable approximation, short, vertical pins may be soldered to the arch wire at points which will engage the distal side of each attachment and thereby hold the centrals together. Then by using each central as anchorage, or better still, by passing the ligature from the distal side of each lateral attachment carrying it mesially and about the vertical pin and tying it, the lateral incisors may then be moved to proper approximation with the centrals.

USING AUXILLARY SPRINGS

It is not always necessary to use the labial arch wire as the direct means of applying force to teeth to be moved for auxillary springs may frequently be utilized to advantage for that purpose. Where space has been created for canine teeth which occupy labial or buccal malrelationships auxillary springs soldered on the main arch wire may be made to engage them and move them

down into position. When deemed necessary such a tooth may be banded and an open tube attachment placed in an advantageous position to receive the auxillary spring. In making such springs, wire 0.026 of an inch in diameter will prove advantageous especially if it is made sufficiently long to provide gentle pressure. The same plan may be utilized in moving other teeth to approximate alignment at which time the auxillary spring may be removed and the main arch wire utilized for subsequent control. (See Fig. 7.)

In addition to covering the more important and essential points of technic in the use of this appliance I also have mentioned those instances where mistakes are most frequently apt to be made. These may be summarized briefly as follows:

1. The attachments must be uniform in size, of proper design, and of a suitable alloy.

2. The working portion of the arch wire must be 0.030 of an inch in diameter. Anything larger or smaller endangers efficiency.

3. In soldering the open tube attachments to bands, the free hand method should not be employed, but both parts should be held together with a suitable pair of pliers.

4. The attachments should be soldered in the center of the labial surface of the band both horizontally and vertically, and the outer half of the rotating arm left unsoldered. To accomplish this an antiflux should be used upon it.

5. Flat-nosed pliers having smooth ends should be used when additional closing of the lips is necessary.

6. In unlocking the arch wire a straight chisel 2 mm. wide having a long, sharp, beveled edge should be used. A narrower or blunt chisel will only make trouble.

7. It is not always necessary to use the main arch wire in applying force to malposed teeth for auxillary springs may frequently be utilized to advantage.

DISCUSSION

Dr. Harvey A. Stryker, Los Angeles.—I felt very pleased to have been asked to open the discussion of this paper by Dr. McCoy. The appliance which has been so ably described and presented merits a most courteous and serious consideration, if for no other reason than the fact that it comes from a man whose experience both as a practitioner and teacher dates back many years.

It is very commendable that Dr. McCoy should step forward at a time when everything tends toward standardization and present for your persual an appliance which, though literally scrapped at one time because of certain discrepancies in design and construction, is today the very essence of perfection in mechanical design and utility as a result of the patience and skilled experience which he has put into it.

To quote from Dr. LeRoy Johnson, "Modification of methods and ideals is the inevitable consequence of growth. Moreover it is axiomatic that the heresy of one age is the orthodoxy of the next. Although developing pains hurt, they lead to larger life."

Orthodontia is a biologic science and as such we are bound to recognize the fact that form in bone and tooth position is controlled by function. The trend of our thinking is in this direction and we cannot avoid it. We should, however, not be too greatly influenced to the extent of decrying the importance of mechanics in orthodontia, at least until such a time that the status of orthodontia as a science is more standardized than it is at the present time.

To grasp a comprehensive understanding of the technic as presented by the essayist requires more than a casual reading of its general contents. Much of great importance can be lost unless the subject matter is studied painstakingly word for word. Patience, perseverance and skillful manipulation are essentially necessary for the proper construction and use of the open tube appliance.

The essayist has, in his characteristic way, covered the technic so thoroughly and in such detail, that it would be simply a matter of repetition to discuss the paper from that angle. I shall, however, touch on a few points merely for the sake of emphasis.

I have used the open tube appliance continuously for the past five years, during which time it has been my pleasure and privilege to be in close personal touch with the essayist. I have been agreeably surprised and inspired from time to time in observing the wonderful results Dr. McCoy has obtained, over comparatively short periods in treatment. My own results have been most satisfying, in fact I have been unduly carried away at times with enthusiasm. No other labial appliance has, in my experience, been so positive in its action and so gratifying in its results, to say nothing of the added comfort to the patient, as compared to many other forms of labial appliances.

To be sure, it is not an unusual appliance and cannot be used for all things and in all places. I am positive the essayist wishes it thoroughly understood that he does not recommend the open tube appliance as a universal labial appliance. To my mind, however, this appliance fulfils a very important function in the matter of uniformity of force distribution and force control. This cannot be said of some forms of labial appliances now in use.

The opening paragraph of Dr. McCoy's paper is very significant and doubtless explains the cause of failure by many, not only in the use of this appliance but any appliance requiring skillful manipulation. Take for instance the lingual appliance in its present highly developed form; what appliance is more abused in present day practice than is the lingual appliance. Failure to follow detailed instructions in both its construction and use has brought upon it unjust criticism. The same explanation may be given for the dissatisfaction expressed by some in the use of the open tube appliance.

The construction of an appliance is only one side of the story. To quote from our beloved friend and teacher Dr. John V. Mershon, "It is one thing to know how to construct an appliance but an entirely different matter to know how to use it intelligently."

First of importance in the construction of the open tube appliance is that of the proper band material to which the attachments are to be soldered. A house is no stronger than the foundation upon which it is built. This material should be of gold platinum content and reasonably stiff and resilient. For the anterior teeth the material should be 0.004 x 0.12 in gauge. The band material should be accurately fitted and burnished to the tooth or much of the efficiency in the use of this appliance will be lost.

Anyone first using the open tube appliance may avoid much difficulty by following explicitly the directions of the essayist under the heading of "Soldering the Attachments." To reiterate, I will mention three outstanding points: first, don't try to solder the attachment to the band without first placing antiflux under the longer arm of the attachment; second, do not use the free hand method in soldering the attachment to the band; third, purchase a delicate pair of S. S. White band soldering pliers, trim the beaks down to the desired size for holding the attachment during the soldering operation, and use these pliers for no other purpose.

To avoid further repetition I shall defer from further discussion of the technic which has been so comprehensively presented to you by the essayist. Briefly, we are all striving toward the ideal of having a uniform consistency existing at all times between the mechanical principals involved in the appliances we use and universally known and admitted laws of tooth movement.

The present status of orthodontia is very disillusioning. As cases present for treatment we are confronted with the problem of what type of appliance to use in each particular case. Until such a time as we shall have a standardized method of procedure we are compelled, through mere necessity, to use those types of appliances which have proved the most

successful, from every standpoint, in the hands of men competent by years of skilled experience and matured judgment to use them.

Dr. James D. McCoy is numbered among those few unselfish men who have contributed largely to both the scientific and practical sides of our specialty during the past decade. In the words of Dr. Eby, "The spirit which has actuated these men may be pointed to with the pride of unselfish attainment. Let us not take the gems of knowledge gleaned by our great thinkers and nibble at them critically. Let us not view their work as if to precondemn, but instead let us combine our interests, stimulate them with confidence and assist in the volumes of work ahead toward the end of great accomplishments."

RELATION BETWEEN ORTHODONTOLOGY AND DENTAL PROPHYLAXIS AND HYGIENE*

By Angelo Chivaro, M.D., D.D.S., Rome, Italy

(Director of the Royal Clinic Institute of Dentistry and Dental Prosthesis of the Royal University of Rome)

BEFORE going into the known subject of "*Relation between Orthodontology and Dental Prophylaxis and Hygiene,*" let me excuse myself for using the word *orthodontology* instead of *orthodontia.* In Europe we use the word *odontology,* which is derived from the Greek language and is formed by *odous* (tooth) and *logos* (discourse, treatise, science) and is synonymous to the word *dentistry* in use in the U. S. A. and which comes from the Latin *dens, dentis* (tooth).

Now if we use the term *odontology* for mentioning the "*science of the teeth,*" when we wish to mention the "*science of the straight teeth,*" the Greek word to be added to *odontology* is "*orth*" which means *straight* and we have the composed word *orthodontology,* but not *orthodontia,* which means only *straight tooth,* from *orthos* (straight) *odous* (tooth) and *ia* the Greek ending, which indicates that the word, to which it is attached, is a substantive.

In conclusion, while *orthodontology* literally means "*The science of the straight tooth,*" *orthodontia* means "*straight tooth,*" the latter meaning what we do *not* intend to express; therefore, it is clear that we should not use *orthodontia* in order to express *orthodontology* when we have in all our modern dictionaries such a word with the *right* meaning. In fact, we may use in opposition to *orthodontia,* taken for what it means, the word *disondontia,* which means *bad* or *crooked teeth.*

Some years ago the *European Orthodontia Society,* by our modest suggestion, changed its name into the more accurate one of *European Orthodontological Society,* and while I am on the thesis of correct terminology, which is the basis of any serious art or science, let me point out that, erroneously, often *dental prophylaxis* is confused with the meaning of *dental hygiene* while it should be clearly understood that *dental prophylaxis* means the *prevention of diseases of the teeth* and *dental hygiene* means the *preservation of the health of teeth.*

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*Read before the First International Orthodontic Congress, New York City, August 16-20, 1926.

Since we were taken hold of by the enthusiasm for *the science of regulating teeth* from our first beloved, late teacher, *S. H. Guilford,* in 1897, we clearly saw the close relation between orthodontology and prevention of diseases of the teeth and preservation of the health of the teeth, and we had the confirmation of our prevision during the first dozen years of our dental practice. So we took advantage most eagerly of having in Rome for more than one year our dear friend, the late *Dr. William G. Law,* who it is known, was one of the pupils of our great *Dr. E. H. Angle,* and who was also the first president of the *European Orthodontological Society,* which he founded and we learned orthodontology as much as we possibly could under him.

If we glance at any textbook of dental pathology, we shall see that malocclusion might be one of the predisposing causes or the direct exciting cause of almost all the diseases of the teeth, in fact: (a) The caries and the following diseases of the dental pulp and pericementum may be due to the predisposing condition of almost any irregularities of the teeth which, if not in normal mesiodistal position are the principal predisposing causes of lodgment of fermentable materials and ferments. Our dear, late teacher, *Henry Burchard,* in his "Dental Pathology," 1898, wrote: "If teeth be arranged in such a manner that uncleansible spaces are formed between adjoining teeth, a predisposition to caries is created." Such old statements, not only do not need any demonstration, but also stand as among the predisposing causes of tartar formation and following gingivitis, being the deposits of saliva calculi, a local mechanical predisposing cause of gingivitis. And, in the general practice, everybody has noticed how quickly salivary calculi are formed in almost every case of malocclusion. (b) No demonstration is needed to prove that malocclusion of the teeth is the principal cause of abnormal stimulation of the pericementum, followed by the pathologic sequelae, which we all know. (c) The malocclusion for crowded teeth is the principal cause of abrasion of the enamel and formation of cutting edges, which often are the causes of diseases of the tongue and mucous membrane of the mouth, and such pathologic injuries go from the simple apatha to the most undesirable malignant tumors. Everybody must then admit that orthodontology, seen under such light, is the real prevention of the above enumerated dental diseases.

Such close relation between orthodontology and dental prophylaxis, strongly possessing our mind, has directed the plan of our professional dental services and so we saw the utility at any age of the *Correction of irregular position of teeth in adults,* such being the title of a paper published by me in 1912 in No. 4 of the *Deutschen Zahnärztlichen Zeitung.* (Berlin.)

In this paper I have demonstrated the possibility of correction of some irregularities of position of teeth in adults, even in advanced age, by slow and gradual displacement and by other original systems and methods of correction and retention, which we adopted: I justify and prove my assertions by numerous cases treated with excellent results; amongst these are: shortening of excessively long dental crowns; straightening of teeth turned on their longitudinal axis; reduction to normal position of teeth displaced mesiodistally, vestibularly or lingually to the dental arch, etc.

The frequency of irregularities of teeth in children between three and six years of age (28.90 per cent in our statistics) and the following pathologic consequences gave us the opportunity of presenting at the Sixth Meeting of the *European Orthodontological Society* held in London in 1913, my study by the title of *"Malocclusion of temporary teeth,"* where, following Dr. Angle's axiom that *"the early age is the golden age,"* I tried to show the necessity of sharing the opinion of eminent orthodontologists that malocclusion of deciduous teeth is often the cause of malocclusion of permanent teeth. Consequently, the correction of malocclusion of deciduous teeth is often a prophylactic treatment against some dental diseases of deciduous teeth, and lately, in 1921, I published the paper *"Temporary teeth, not separated, permanent teeth irregular"*[1] in which I emphasized the necessary preventive care for the conservation of temporary teeth and the prevention of irregularities of position of the permanent teeth which is a cause of dental diseases.

There is no doubt that the external form of the crowns of the teeth is a protection for the gingival margin and the marginal portion of the pericementum against the traumatic injuries given by the mastication of food. I have proved such statements by the following studies: "Upon the Physiological Morphology of the Human Teeth";[2] "Experimental Researches Upon the Physiological Morphology of the Upper Posterior Small Incisors of Rabbits";[3] "The Frequency of the Supernumerary Cusps Upon the Temporary Molars."[4]

In these papers I came to the main conclusion that the lingual tubercles of the anterior superior teeth of man *(cingula)*, the fifth cusp of the human teeth, the supernumerary tubercle upon the mesiovestibular cusp of the first temporary superior and inferior policuspidetes, which I described for the first time,[3] they all, besides the masticatory functions, have a protective function of the gingival mucous membrane and underlying tissues.

But such physiologic morphology of teeth would be perfectly useless, in order to protect the periradicular tissues from the traumatic injuries of the mastication, if the teeth did not stand on their normal mesiodistal position and in their normal vertical position. I, in fact, remember having cured cases of the so-called pyorrhea alveolaris of mandibular anterior teeth in linguolabial inclined position only by reducing such teeth to their normal vertical position. We see very often some policuspidetes (molars), morphologically well formed, inclined mesiodistally, irregularity due to the missed next mesial tooth, with pyorrheal pocket on the mesial surface of their mesial root.

And here I take this good occasion to present this paper before such a competent gathering of scientists to point out that, for these last twenty years, we have firmly believed that the relation between orthodontology and dental prophylaxis and hygiene was to be considered highly important, we may say, the *sine qua non* of the preservation and conservation of teeth from the pyorrhea alveolaris, and such opinion we firmly held also when in the last months of 1913, I, *first*,* found the constant presence of *Entameba buc-*

*History, critique and bibliography on *"Entamoeba Buccalis"* as a supposed specific cause of alveolar dental pyorrhea—Annali di odontologia, settembre, 1916—Roma.

calis in the pus of all the twenty-one cases of pyorrhea alveolaris examined,* our opinion of the causes of pyorrhea being that *the pus formation is the result of the action of pyogenic bacteria upon dead regions of pericementum, which are due to different kinds of mechanical or chemical injuries,* as I shall try experimentally to prove some time in the near future.

After having clearly proved that orthodontology is in close relation with the prevention of diseases of teeth, I do not believe it necessary to make use of numerous arguments to prove that personal hygiene of the teeth is very difficult, if not impossible, when all the teeth, or some of them, are in malposition, or in malocclusion; in fact, we all know how hard it is to keep clean, after each meal, teeth which are crowded, inclined, or rotated in their longitudinal axis, and how the gingivae, in such cases, are always bleeding: the abrasion of teeth in malocclusion or in malposition and injuries to the pericementum cannot be avoided by any kind of personal hygiene. Consequently, it is self-evident that the preservation of the health of teeth (hygiene) is in close dependence upon the normal position and occlusion of each tooth.

From all that we have briefly submitted to your consideration, I believe I am authorized to draw the following conclusion: *Orthodontology is the fundamental art and science for the prevention of dental diseases and the preservation of dental health.*

There is nothing new in this paper except, perhaps, the wording of the conclusion, which conclusion I would like to have discussed, and eventually modified and approved by the greatest authority of the *First International Orthodontic Congress* in order to spread among the people of the civilized nations the above benefic axiom for the protection of public health, which is the supreme aim of any healing art and science.

REFERENCES

[1]Annali di odontologia Anno VI, luglio, Roma, 1921, p. 177.
[2]Revue trimestrielle suisse d'odontologie, Zurich, 1918, No. 3 and Annali di Odontologia, Roma, Anno II, 1917.
[3]Jour. of the Nat. Dent. Assn., Chicago, October, 1920.
[4]Tr. of the 6th Internat. Dent. Cong., London, 1914.

DISCUSSION

Dr. Abram Hoffman, Buffalo.—It is indeed a pleasure to be asked to open the discussion of a paper by such an eminent confrere as Dr. Chiavaro. It is to be regretted that the doctor has been detained at home and is not here to present his paper in person. Dr. Chiavaro has done a great deal for the uplift of dentistry, not only in Italy but in many circles of Europe; the deeper underlying trend of thought as expressed briefly in his paper offers a substantial evidence for such a statement. Again, his absence is to be regretted because I am sure that many amplifying remarks would have been injected to enhance the value of the presentation.

When questions in nomenclature are introduced there is always an opportunity for discussion and while the doctor's contentions are well founded, nevertheless, it often happens that the continued use of a word gives it a place in our vocabulary. For the information

*Researches upon the *"Entamoeba Buccalis"*—Tipografia, Nazionale. Roma, 1914. *Proceedings of the Forty-First Annual Meeting of the American Dental Society of Europe,* held in Paris, July 20 to August 1, 1914. *Dental Review,* Chicago, Illinois, December, 1918. *Dental Cosmos,* Philadelphia, September, 1914. *Deplorable errors*: in the *"Odontologia Argentina,"* Dec., 1918, Buenos Ayres, edited by Dr. Juan B. Patrone, where it is written: "Prof. Chivaro was the first who studied the morphology of the amoeba and established very clearly that alveolar pyorrhea cannot be ascribed to it."

of our friends from abroad, it may be well to say that in the United States we have, in our orthodontic societies, committees upon nonmenclature engaged in studying etymology and that they will probably give consideration to the suggestion.

There is no doubt about the intimate relationship existing between the three topics or branches of dentistry as mentioned in the paper. It should be perfectly obvious that teeth occupying their proper positions in the line of occlusion, not only function better, but are much easier to keep clean and to keep in a state of health. Regardless of how fortunate an individual may be because of Nature's gift or man's art in the matter of regular teeth, it remains a fact that the personal care of the mouth and the general health of the individual are important factors in maintaining proper health and function within the oral cavity. Without question, malformation and malposition of the teeth *do* have a profound influence upon oral prophylaxis and health, but, thanks to such thoughtful men as Dr. Chiavaro, modern dentistry is doing much to alleviate these conditions for those less fortunate individuals not blessed with the more favorable gifts.

Dr. Chiavaro's conclusion, as he states, contains nothing basically new for we have long used the axiom "occlusion is the basis for all dentistry," but the wording, as he gives it, is perhaps better suited as a phrase to be understood and appreciated by the layman,—it is worthy of serious consideration by this Congress.

A COMPARATIVE STUDY

By Dr. O. W. Brandhorst, St. Louis, Mo.

THIS clinic is offered in the hope that it may arouse in those seeing it, a desire to study more closely existing conditions. While we all know that there are many normal variations affecting the facial contour, it is only after a careful study by comparison, that the vastness of this really becomes apparent.

The cases shown here speak for themselves when compared one with the other. All were recorded according to Dr. Simon's gnathostatic and photostatic method. The points selected and the planes shown are, therefore, identical points or planes, so far as the different cases are concerned.

The cases all have what we speak of as an anatomically correct occlusion. But with all this, the facial contour, recorded angles, chin, etc., reveals striking contrasts. The orbital plane varies in its position anterior to the cusp of the upper canine to the cusp of the first premolar.

In approximately 10 per cent of cases the orbital plane passes through the cusp of the upper canine; in 4 per cent mesial to the cusp; in 50 per cent distal to the cusp of the canine, and of these more than half through the posterior half of the distal incline plane of the canine; in 12 per cent between canine and first premolar and in 23 per cent through the first premolar.

The prosthion was found to vary in its position anterior to the orbital plane from 3 mm. in Case 21 to 14 mm. in Case 45.

These are only a few of the many variations found. Would it not be worth while for all of us to make an effort in this direction? Are the American types prognathic?

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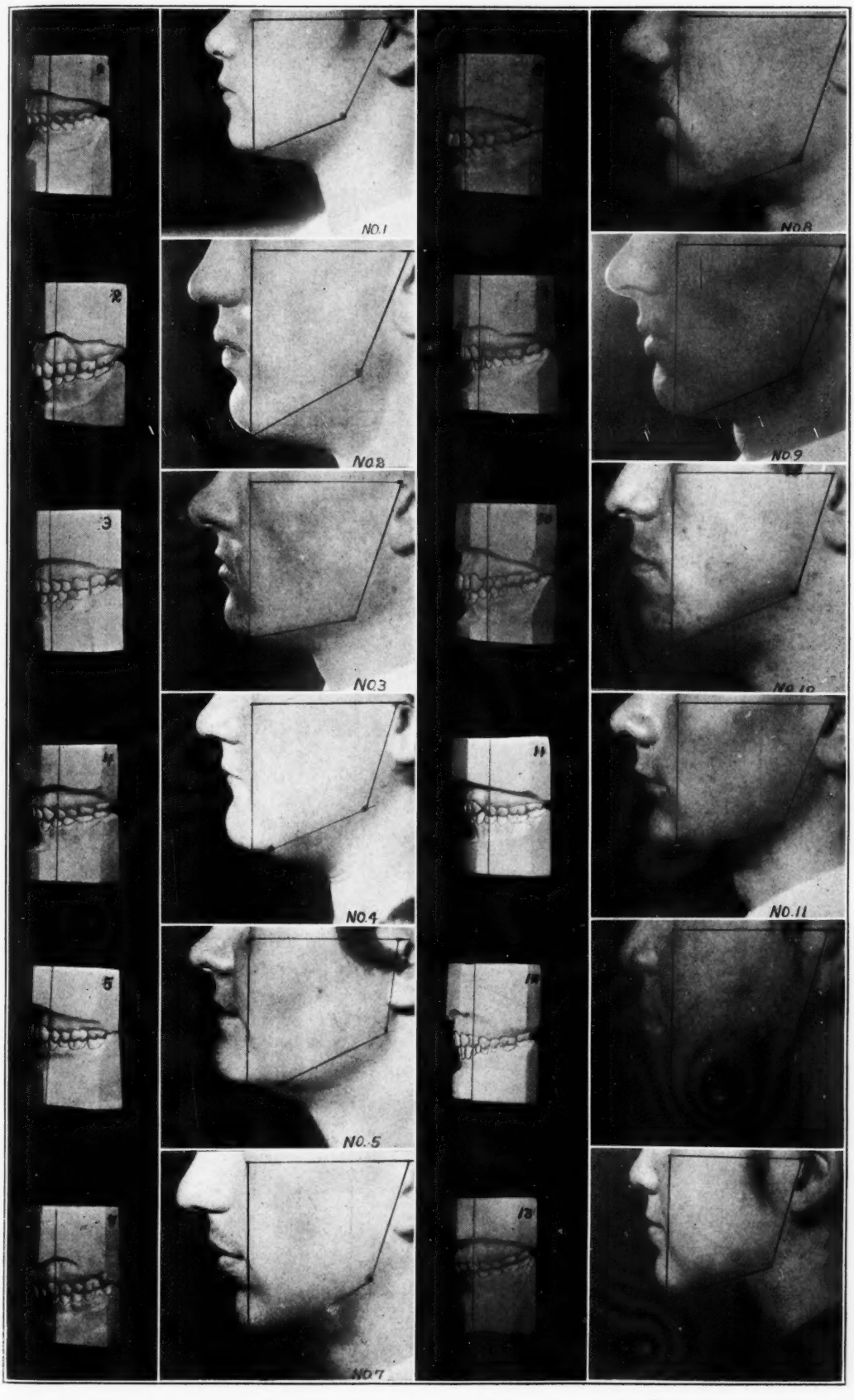
*Clinic presented at the First International Orthodontic Congress, New York City, August 16-20, 1926.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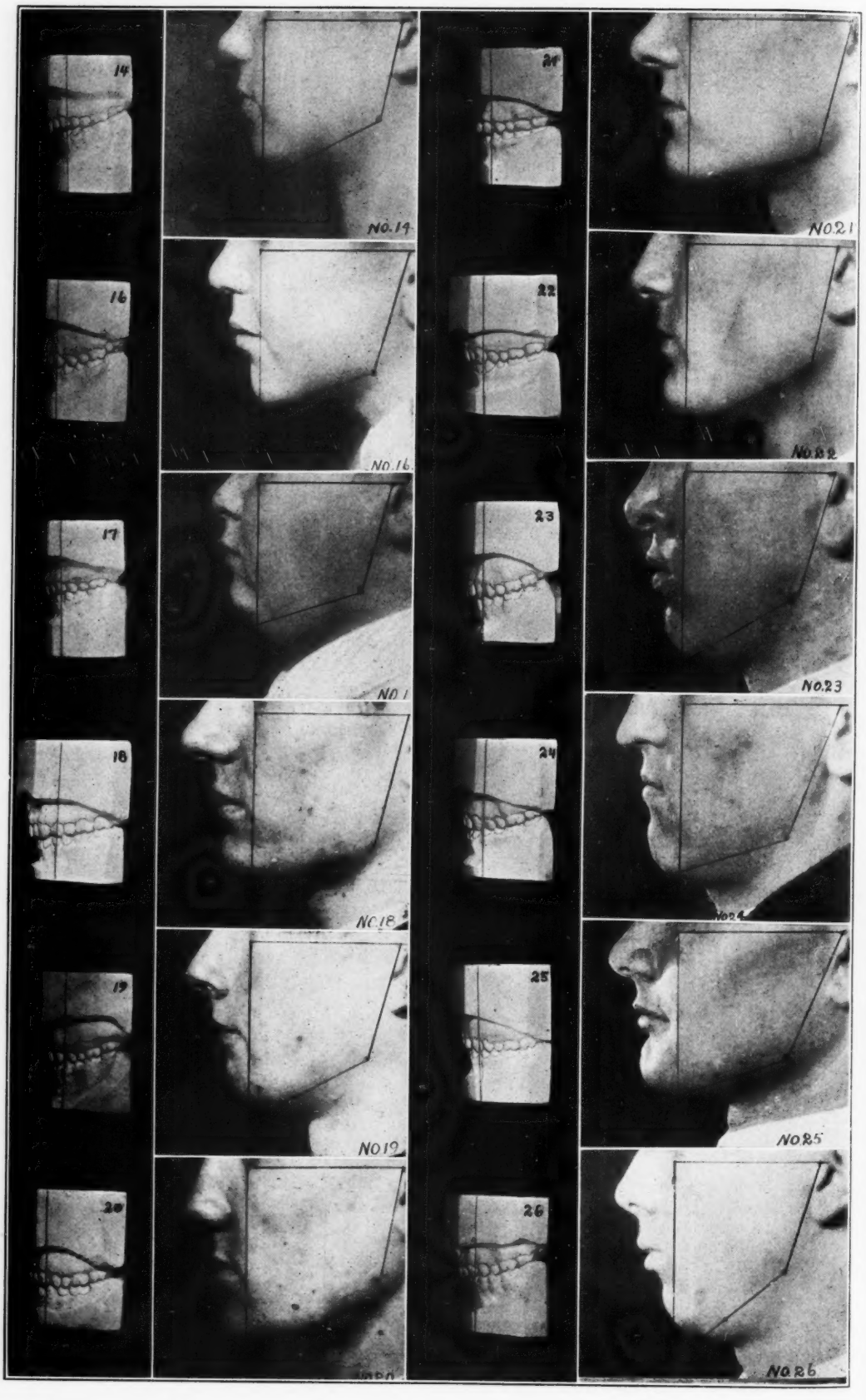
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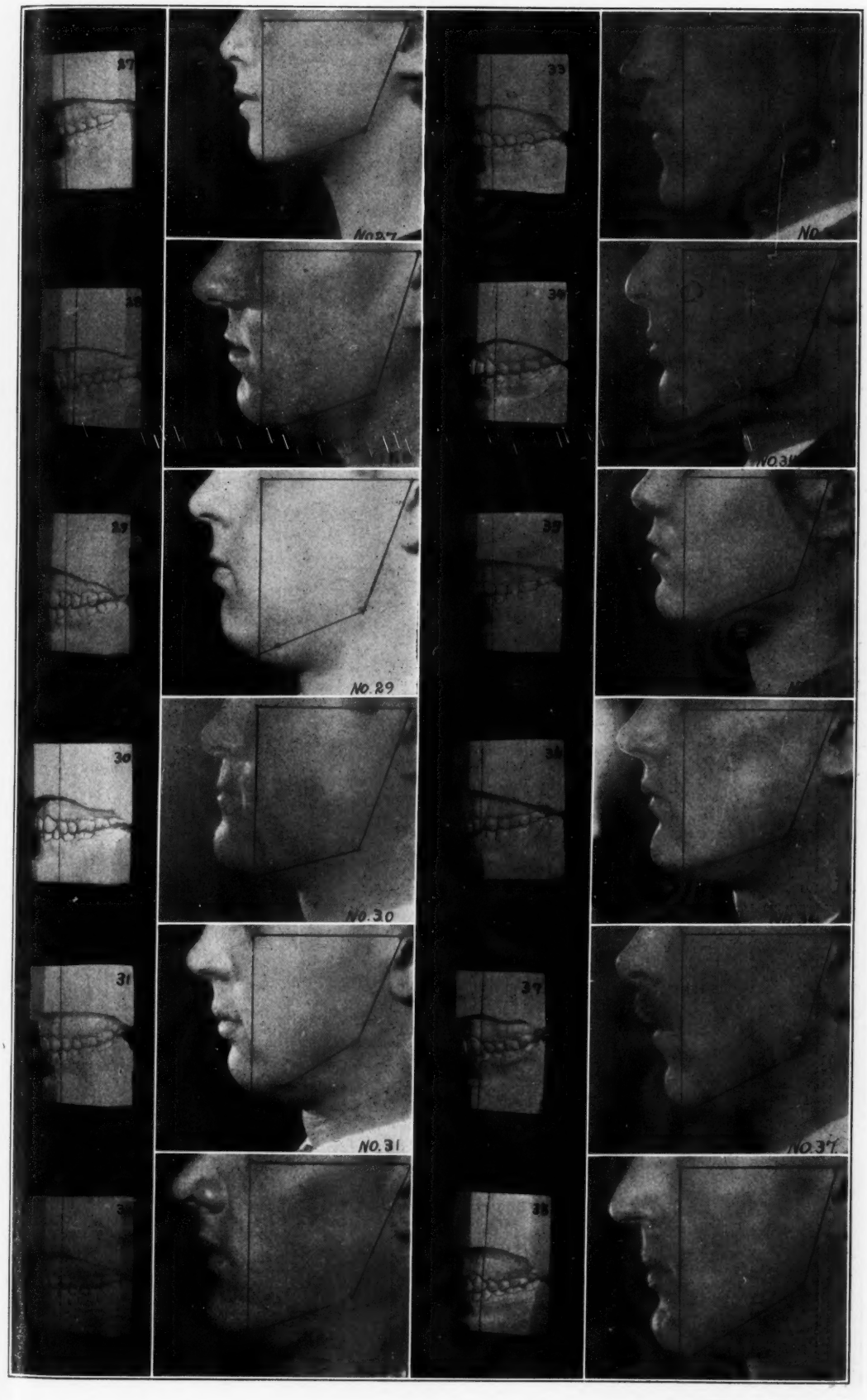
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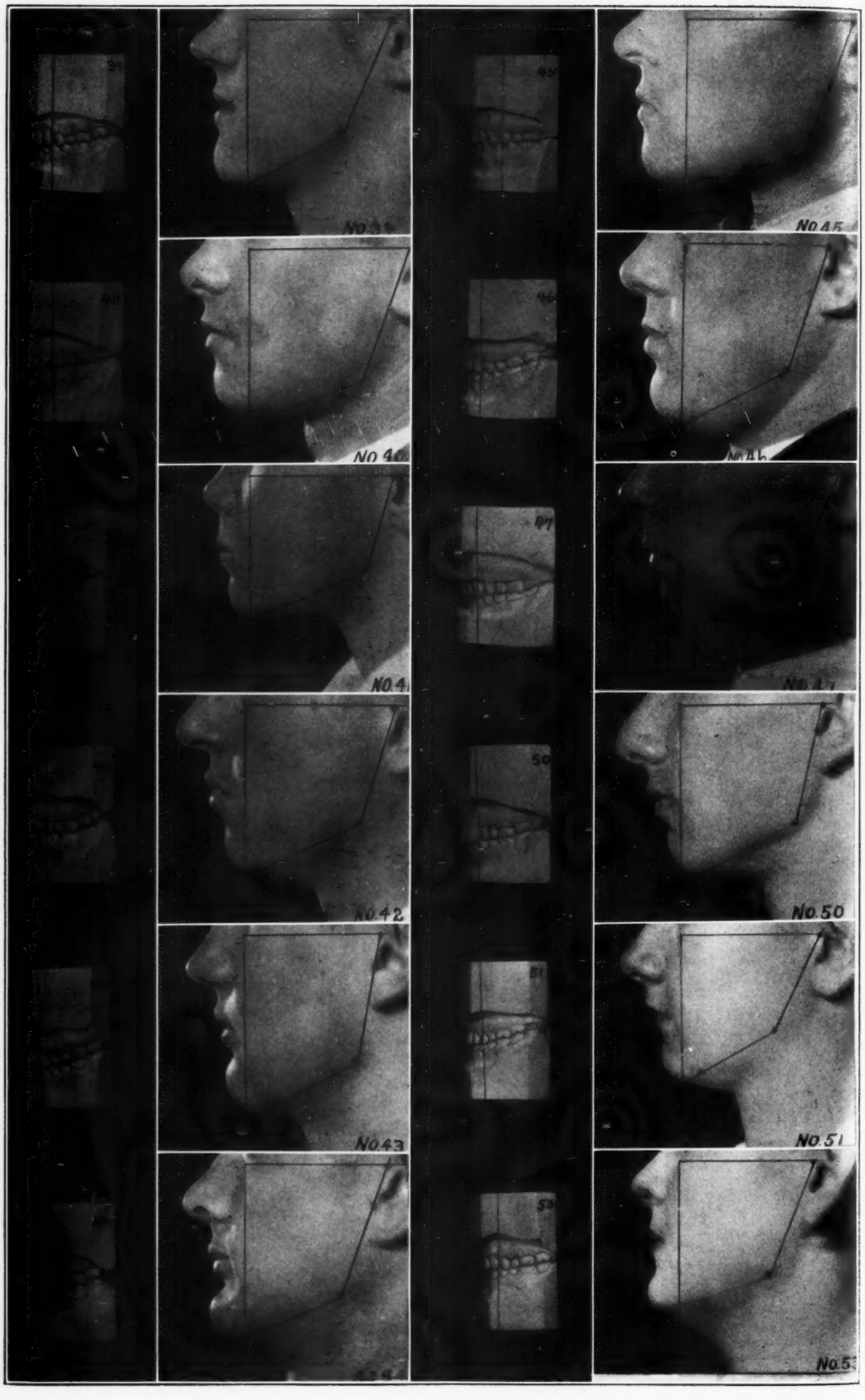
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ENDOCRINODONTIA

LECTURES READ BEFORE THE DEWEY STUDY CLUB

BY DR. DAVID M. KAPLAN, NEW YORK CITY

Lecture IV

IN ENDOCRINE interpretations the antecedents of a patient are of great importance, and endocrine histories, consequently must be very complete, and at times voluminous. Distinctly hyperthyroid fathers and mothers, in a state of endocrine equilibrium, have as a rule very healthy children, of whom they can be justly proud. By this time, gentlemen, I am certain that the tropic trademarks of hyperthyroidism are no longer Greek to you. A slight excess of thyroid secretion is always present in the pregnant mother, and this gland consequently is statically enlarged and dynamically it works overtime. When we find the expectant mother with such an equipment we can predict not only easy parturition, but also a perfect child. These things have no place in your practice as dental doctors, but it gives you a clear idea what one can accomplish in a woman poorly endowed with thyroid secretion by administering thyroid extract. A quarter of a grain of thyroid extract, every other day, is a mighty good and sane therapeutic suggestion to any child-bearing mother, and should be given from the first month of pregnancy up to a week before delivery. The child will surely show the benefits of such management, and the mother will have an easy time of it. Not only is the tropism of the child influenced for the better, but the diseases to which children are subject are also thus affected.

According to Dr. Joseph Fraenkel, the individual from the cradle to the grave does not act as a passive bystander when disease, particularly of an infectious nature, attacks him. He states that every human being is a determinant as to which infection he will succumb to, and which will not in the least affect him. This depends entirely upon this tropism. The term "contracting a disease" is to be interpreted as in law—there being at least two parties to the contract. The party of the first part is the individual, and the party of the second part is the disease. Thyrotropes enter during their childhood into a contract with measles, chickenpox, and whooping cough. Pituitotropes have a predilection for scarlet fever, etc. Where the thyroidal endowment is very pronounced, such as in patients who later develop distinct hyperthyroidal phenomena, you will find that they only had measles during their childhood, and nothing else. Children who only had whooping cough and nothing else are usually thymotropic.

When these diseases affect the child, it is to be remembered that they leave remnants of their sojourn in the body of the individual, and effect changes, slight or marked, in the biodynamic endocrine equipment of the

child and future adult. You certainly will make no mistake by introducing small quantities of thyroid and thus regulate, even in utero, the embryo man or woman.

What such foresight may accomplish for the human race, only the most extensive application of my futuristic vision will prove or disprove. But I firmly believe in the beneficent result of such an essay.

Having thus guided the embryo, it is now time to think of the child. My slogan is "Start the child's bank account of health properly," and for that humanitarian trend there is nothing better than cod-liver oil. Of course, the age at which this is to be given can only be decided by a doctor, and also whether the child has or has not a tendency toward obesity.

The iodine in cod-liver oil is in a form chemically combined with a molecule which from its very nature is an organic animal product, and thus much more readily fits the organic-chemical side-chains within the human body than any form of iodine manufactured in the laboratory.

No matter how distant the relationship between the iodine in the liver of the cod and the iodine in the thyroid of the human being, its kinship is much nearer than that of the laboratory product. And I am sure you remember of what importance iodine is to the proper maintenance of dynamicity in the thyroid, a phase of which I spoke in my previous lecture.

Cod-liver oil is the best way of supplementing and aiding thyroidal work that I know of, from my experience. The distinct thyrotrope very frequently rebels against laboratory iodine, but never against the iodine as found in pure cod-liver oil.

One may inquire how a hyperdynamic thyroid can be benefited by iodine containing therapeutic agents. The answer will depend upon your conception of endocrine disease in its totality. It has been fairly well established that even in the most pronounced forms of hyperthyroidism such as exophthalmic goiter, the subjective and objective display cannot be entirely ascribed to an overfunction of this gland. There are distinct signs which vouch for an underactivity together with the overaction. In an endocrine disease, to safeguard your opinion, do not say hyper or hypo, but use the terms tropism, and dys.

Instead of diagnosing hyperthyroidism, you will be much more to the point if you will say dysthyroidism. And it is the dysthyroidal phenomena which you are trying to influence and regulate with your iodine, and bring about a thyroidal equilibrium.

Suffice it to state that the oil molecule besides iodine also contains other virtues which have a tendency to curb the runaway gland. In the case of marked subactivity, the homodynamic thyroid extract is given on the basis of substitutional therapy. In this instance you are proceeding exactly like the stomach specialist who prescribes pepsin and HCl for a patient with achylia gastrica.

It is therefore correct thinking when I say that there are no pure unmixed biodynamic expressions in any endocrine disease. Very often an exophthalmic goiter will retrogress, and show most of the earmarks of hypo-

activity. My own definition of exophthalmic goiter does not even mention the thyroid gland. It is as follows: "A disease affecting females (and only exceptionally, males) in the vast majority of instances producing marked dynamic changes throughout the body cells characterized by a greatly increased metabolic activity and a profound impressionability of the patient's psyche." In its etiology I lay much stress upon the importance that the gonads play in its production. A psychic or somatic trauma to the gonads of a thyrotrope individual with a hypertendency will be capable at times of producing the exophthalmic goiter drama overnight. Such instances are not rare in medical literature.

The many other forms of impure type of this disease are to be gathered from among individuals who had a trauma or shock during the developmental epoch of the gonads, or as I call it, the gonado-advent, and that the trend of these glands, insulted at an unripe age, flushed the thyroid into an overactivity, with the expression of constant fright on the face. Some have designated such a face as showing "frozen fear."

Here is another index pointing to the gonads as very important factors in the etiologic conception of this thyroidal disorder. The postmortems which I have performed on cases of Basedow always showed something wrong with the uterus, even in virginal patients. In two of the latter class fibroids were found in the uterus. One was forty-eight years old, and the other twenty-one.

Much more could be adduced to the somatic tropisms of the thyrotrope individual, but what I gave you above, if well understood will give what I believe a good start in designating your patients.

I will now give you data which will lift the curtain of mystery hiding the thyrotrope on a biodynamic plane. You all know that every cell, after it has performed its duty for a certain length of time, degenerates and dies. The albumin molecule breaks up into its component parts, and the by-products of this decay are eliminated by the emunctories. As long as the function of the thyroid is normal this process of elimination goes on at a rate consistent with health. As soon, however, as thyroid dynamicity is impaired, and sinks below this "hygienic par," the products of decomposition cease to be carried off at the required rate, and with the result that they accumulate *in situ* in the form of mucin, fat, and other by-products. The cells of a given part become clogged with this biologic garbage, and a peculiar edema, hard to the touch, results. This edema, unlike the nephritis puffing, does not pit on pressure. It is from this phenomenon that the term "myxedema" is derived, a term used to include most maladies due to thyroid hypofunction. In some instances it is very marked, and in others requires much clinical acumen to be at all detected. But thyroid extract, on a homodynamic basis, promptly removes these deposits. Such patients are extremely grateful for the relief given them, and though they may lose ten pounds in a week, they nevertheless feel lighter, brighter, and stronger, and their appearance is rejuvenated to a marked degree.

The process whereby the thyroid accomplishes its work as a regulator or equilibrizer is a twofold one, viz., it promotes cell growth, and furthers the elimination of waste products. It watches over the dynamic functions

of organs through the medium of the trophic centers, and controls the general chemistry of the body. It may be advanced that the maintenance of an even normal temperature is dependent upon the dynamic integrity of the thyroid gland. When it functions too slowly one feels chilly, with cold hands and feet even in bed under warm blankets. If these mild forms occur in married women, they will tell you that they never felt better than when they were pregnant. This well-being continues during the lactation period, but as soon as the child is weaned, and lactation has passed, the hypothyroid woman again falls into her former state of lassitude, torpor, chilliness, and general infiltration.

Now, you will say, why is this? The answer is very simple. You know that during pregnancy the thyroid enlarges. This enlargement continues during the lactation period, and this being a healthy biologic concomitant of hyperfunction, the hypothyroid woman manufactures in her own body the stimulus necessary to wake up her thyroid and receives her constant quota of this necessary secretion during pregnancy and during lactation. Again you have a biologic wink from the gonadal department that it is by no means a silent partner in the dynamic establishment of which the thyroid is the chief executive.

And now, gentlemen, a question. Why is it poor therapeutics to give patients with exophthalmic goiter milk? The answer is simple. In the lactating organism there is a something which stimulates the thyroid gland sufficiently to cure a patient of her myxedema. In other words, she causes her thyroid to enlarge, and overfunction. Some of the thyroid stimulines (pardon my love for coining words—as if we did not have enough already) are present in the milk, and the baby needs them, and gets them. But does the Basedowic need them? On the contrary, she has too much as it is. When the gonads are at perfect rest, the thyroid works more adequately in unison with the needs of the rest of the body.

You as dentists will not infrequently treat a patient who will complain of what may be called migraine. The headache of thyroid hypofunction assumes two forms: at times it starts in the frontal sinuses, extends to the orbits, but always remains frontal. It may resemble the early coryza headache. At other times the pain will originate in the occiput, and the painful occipital nerve lends it the character of a neuralgia. From the occiput it invades other portions of the head, and the patient describes it as an attack of migraine. But here is the difference between this pseudomigraine on a hypothyroid basis, and the true migraine. The former is invariably worse in the morning, and entirely disappears in the evening, after a good dinner. Whereas, in the true form, a full stomach aggravates the condition, and such a patient is often relieved by vomiting.

You may construct your own symptomatology, basing your conclusions on the fact that cell growth and cell functions are diminished, and waste products are increased in any part of the body. That is why, you may argue, the hair falls out, and also the reason premature baldness develops, particularly in spots over the occipital region.

And the dizzy spells, due to waste products in the cranium, and ringing

in the ears without an auditory pathology, and spots before the eyes. Undue somnolence is at times very distressing, particularly when one wakes up at ten o'clock or later, and is still tired and unrefreshed. These patients are often melancholic, and depressed, and prefer to be left alone. Though their perceptive powers may be intact they do not venture an opinion, for to attempt it would unduly tire them. Such people are unduly pessimistic, and women of this type get into a panic over nothing. They see everything through blackened glasses, and live on the edge of a species of chronic despair.

In the case of the richer classes we find the one who thinks herself an incurable invalid, and becomes alienated from her friends by constant complaining. She lives in a state of complete indifference to her surroundings. In the case of the lower classes, it is not difficult to guess at the condition of the household when the mother is a hypothyroid sufferer. The disorder, the lack of economy, the dirt, and the waste combine to create a veritable inferno. Nailed to her bed by migraine for weeks at a time, her vitality is additionally sapped by a profuse menorrhagia.

There are families free from the taint of alcoholism or vice, yet who are unable to make both ends meet. In the majority of such cases the key to the situation lies with the hypothyroidtropism. The greater number of the children and adolescents are the victims of nocturnal enuresis, having inherited from their mother this hypothyroid inconvenience. Feeling much improved during her pregnancy, the patient more often than not brings her baby to the world at full term. But in some cases even the gonadal quietus is not sufficient to urge into normal activity the sleeping thyroid. And if it did respond for a time, it may not have been long enough, resulting in a reestablishment of the menstrual flow, and the fertilized ovum is carried off in the flood. Herein lies the secret of the many abortions which are the tragedy of so many women's lives. I know of a patient who had five such mishaps and after thyroid treatment, which she took for six months, she gave birth to a healthy girl.

Should you note a patient who is too small for his age, and suffers from hypertrophied tonsils, and pharyngeal adenoids, you may rest assured that you are dealing with a hypothyroid individual. Tragedy is enacted when such a patient begins to complain of a pain in his appendical region, and a surgeon assumes the rôle of a vicarious endocrinologist, substituting the knife for thyroid extract. I have seen too many such, one even in my own family, where a surgeon, foremost in American and European surgical attainments, advised the immediate removal of the appendix. This was twelve years ago, but no appendectomy was performed. You know yourselves that too many appendices are being removed, and too many tonsillectomies are performed. I may hope to receive your approval by taking a stand against such promiscuous dealings, particularly as I understand that you have troubles of your own in the case of filling healthy six-year molars in order to prevent future decay of these teeth.

In every profession we find experts whose chief exploit consists of "shooting at the moon." Alas, there are some, however, who take them seriously. Had I my say in these matters, I would have in every professional society a

number of cool, sane men, upon whose judgment one can depend, and for the want of a better name call them the "Muzzling Committee."

To return to the hypodynamic thyroid, just remember that it is nothing more or less than a diminution of the nutritional exchanges. As to therapy, you have gleaned from my remarks enough to enable you to handle successfully the greater majority of thyrotropes, be they of the hyper or the hypo type. To treat the patient and not the disease is one of the therapeutic aphorisms which we serve in speech and neglect in practice. I simply remind you of this because if you are of the above contingent you will most certainly fail, where you could have succeeded.

And in all of your experiences with exophthalmic goiter patients, advise against the knife. I am quite certain that a fatal case of Graves' disease needs no surgeon to help her to die—unless she is particularly in a hurry to embark on the great adventure. Personally I am the happy witness of cases where the surgeon and the Eternal Reaper were both hoodwinked. In more than a dozen instances such patients, three of them my own, have survived their threatening funerals, these latter by five, eight and eleven years, respectively. Operative procedures in Graves' disease represent the heroic application of loose conclusions from insufficient data. In spite of all that it is possible to urge in their favor, it must be obvious to any thinking person that, so far as their immediate consequences are concerned, these operations are by no means free from serious danger. The best surgical results do not exceed the results of careful medical treatment. I therefore ask, where is the excuse for operative measures? This is a particularly imperative question, for who ever established that the real seat of the disease was in the thyroid? The evidence points strongly, even overwhelmingly, in the direction of showing that the thyroid is merely an unwilling agent in the production of the symptom and reflects, reluctantly enough, a disturbance which originated elsewhere.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

The Doctrine of Focal Infection in Berlin. F. Trebitsch (Berlin). Zahnaerztliche Rundschau, December 19, 1926, xxxv, 51.

On November 18 the Berlin Dental Society discussed this subject, the paper of the evening having been read by Precht of Konigsberg, although it had been prepared at the request of Professor Adloff because he had spent a year at the Mayo Clinic with Rosenow. The subject is no doubt underrated in Germany, largely because of the book published for German readers several years ago by Martin Fischer which seems to have been misleading in its effects. Rosenow worked originally with Billings and has now labored continuously in this field for over fifteen years, the last eleven of which were spent at the Mayo Foundation. As a result of these labors the Mayo brothers have evolved the proverb that the surgical treatment of the stomach and intestine originates in the mouth. Among the diseases due to streptococci present in oral lesions are: affections of the joints; heart and its valves; acute glomeronephritis; peptic ulcer; colitis ulcerosa; appendicitis; all of the rheumatisms; typical sciatica and chorea; erythema nodosum and herpes zoster, etc. But despite the enormous experience and great authority of the Mayos, the subject of dental focal infection is one of bitter controversy which splits the ranks of both medical men and dentists into two camps, one of which, following the Mayos, is for promiscuous extraction and the other is in varying degree conservative.

Professor Gudzent, the internest, scouted the idea that focal infection could cause rheumatism; in his experience ablation of infected tonsils was without effect on the course of the disease. Professor Citron, also an eminent internist, thought that dental infection could explain some of the cases of cryptic sepsis which have always perplexed physicians.

Professor Adrion who had met Rosenow at the Mayo Clinic thought that the importance of focal infection had been exaggerated but the conservatives will have to match the results claimed by the extractionists. The doctrine has had a revolutionary effect on American dentistry. Professor Strauss held that we should not overvalue apparent cures of disease by extraction of the teeth. We know that infection from the tonsils will set up nephritis but only exceptionally will excision of the tonsils lead to a cure of the lesions in the kidney which are therefore doubtless due to the bacterial toxins and not to metastasis

of bacteria. Colitis ulcerosa he visualized as a dysentery with secondary infection by pyogenic bacteria.

Professor Wolff-Eisner warned against confusing tuberculosis with cryptogenic sepsis; and when in the presence of apparent focal infection he would test the patient with the von Pirquet and make cultures from the blood. Dr. Fraenkel believed in elective localization and cited the affinity of typhoid bacilli for the gall bladder. Professor Finkelstein the pediatrist stated that in the entire literature of infected tonsils he knew of but two works in which the cases were scientifically documented. Dr. Lichtenstein stated that in joint diseases the teeth would have to be pulled before the lesions had advanced too far. He thought many cures attributed to medicinal spring waters were due to extraction of diseased teeth. Professor Proell stated that the interest in focal infection was much greater in Germany today than a year and a half ago when he reported personal cases. His views today have become stronger with the passage of time. Dr. Precht in closing stated that while he saw no miracles in the Mayo Clinic many crippled men left much improved after extraction; they did not run but got about well with canes.

General Septicemia Following Dental Operations. L. Harris and M. Ecker (New York). The Dental Outlook, February, 1927, xiv, 2.

General sepsis of oral origin is naturally quite a different proposition from the latent focal infection from dental foci. In the latter case serious affections may be set up at a distance but there is no picture of acute general sepsis with its chills and high temperature and frequent fatal outcome. Recently Dr. G. Blumer, the well-known physician, reported a series of four fatalities due to the extraction of abscessed teeth and the authors are able to duplicate this experience with four others. In this connection the authors cite several other fatalities due to thrombosis of the cavernous sinus of dental origin. In this entire series of fatalities there was no evidence of sepsis until after an extraction or other dental operation. In some of these a local abscess formed and was evacuated and drained but the fatal progress of the disease was not checked, while in the others surgery could do nothing and the only measures used were medical. Cases of this type are by no means always fatal and the authors have another series of cases, very numerous, in which incision and drainage of the local abscess sufficed to cure the patient, or otherwise stated, the symptoms were probably due chiefly to the pent-up pus. Multiple drainage is doubtless responsible for the recovery of some of these patients. The cases which recover may show no more favorable progress than the fatal series and not until the final outcome does the oral surgeon know which of his patients will recover. When the latter seem out of the woods a new focus may form and the patients' resistance give out. In this class of case radiography of the teeth throws no light on the situation. Should thrombophlebitis develop the outcome is almost necessarily fatal if the cerebral sinuses are involved.

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EDITORIALS

Principles and Practice of Oral Surgery*

THE first chapter of this book deals with the "Dento-Alveolar Abscesses," while the second chapter is devoted to "Osteomyelitis," and the third chapter to other diseases of the bone. These subjects are treated in a standard manner. Nothing particularly new has been offered that is not already known.

Maxillary sinusitis is considered and operations illustrated which we question as being in the realm of oral surgery. We believe the average oral surgeon should not perform operations on the antrum because the antrum, unquestionably, belongs to the rhinologist. Antrum operations should go to

*Principles and Practice of Oral Surgery, by S. L. Silverman, D.D.S., F.A.C.D., published by P. Blakiston's Son & Co., Philadelphia, Pa. Price $6.00.

the man who has an M.D. degree and is practicing rhinology. Much criticism has recently arisen in the medical profession because certain oral surgeons have insisted upon opening into every antrum for which they can possibly find a reason. Even in those cases where the floor of the antrum has been involved by dental infection, the oral surgeon should treat that part of the condition rising from the tooth and leave the treatment of the antrum to the rhinologist.

Tumors of the jaws in the maxillary bone are also considered by the author.

The chapter on "Fractures" is very well written and very profusely illustrated. This is probably the best illustrated chapter that has appeared in any work on oral surgery. The writer calls attention to his method of treating displaced condyles following a fracture of the neck of the condyle. Fractures of the maxillae and malar bone are illustrated.

"Irregularities of the Teeth and Jaws" is the title of one chapter. The subject is covered in entirely too brief a manner to be of any value to the student or practitioner. In fact, the whole book contains beautiful illustrations, but the text on every subject is much too limited.

There are 280 illustrations, a great many of them being full page illustrations. There are only 326 pages in the entire book which necessarily give the illustrations for text.

Lectures on General Anesthesia*

WE ARE in receipt of the lectures delivered in 1925-1926 at the Royal Society of Medicine on the subject of "General Anesthesia." These lectures were arranged by the Dental Board of the United Kingdom to further postgraduate study and all have been published in various journals but are now presented to the profession in one bound volume.

The lecture on "The Control of Respiration in Anesthesia by Inhalation of Carbon Dioxide" was delivered by Dr. Yandell Henderson, Ph.D., Professor of Applied Physiology, Yale University. In this lecture, great stress is given to the control of breathing during anesthesia and the effect of carbon dioxide on the general condition. The technic for rapid induction of anesthesia and the relation of blood and alkali is a part of the subject.

The second lecture deals with "The Absorption and Elimination of Volatile Substances through the Lungs in Relation to Anesthesia, to Poisoning by Gases and Vapors in Industry, and to the Treatment of Asphyxia." This lecture was also delivered by Dr. Henderson. It treats with application of certain laws relative to gases regarding absorption and elimination. Certain irritating gases and their effect upon asphyxia are also considered. Anesthesia and asphyxia as produced by gases in certain industries are mentioned particularly. The importance of carbon dioxide mixed with air as influencing anesthesia in asphyxial cases is carefully discussed.

*Lectures on General Anesthesia, published by The Dental Board of the United Kingdom, 44, Hallam Street, W. I., London, England. Price Five Shillings Net.

The question of "Circulatory Changes in Anesthesia and the Use of Oxygen" is the title of the lecture delivered by Professor Leonard Hill, M.B., M.R.C.S., L.R.C.P., F.R.S. This lecture considers circulatory changes on living animals during various types of anesthesia.

"The Metabolic Changes in Chloroform Poisoning" was delivered by Professor D. Noel Paton, M.D., F.R.S. A careful analysis of the action of chloroform on different structures and tissues of the body as reviewed by postmortem examinations is the subject of this lecture. Various chemical changes as carbohydrate metabolism as influenced by chloroform is carefully considered.

The various subjects above mentioned were treated by experts in their particular line and the information covered in this volume is the most modern and up to date that we have seen. The lectures are also made more valuable by the extensive bibliography to which the reader can refer.

Bacterial Infection—With Special Reference to Dental Practice*

"BACTERIAL INFECTION" is the title of a volume covering the field of bacteria in a very complete and concise manner in which the morphology and physiology of bacteria are carefully considered. Factors which promote the growth of bacteria as well as those which inhibit are treated in such a manner as to make the subject very understandable to the student.

Of particular interest are the chapters on "The Characteristics of Infection," "Factors Predisposing to Infection," and "Types of Infection." These chapters are prepared purely from a bacteriologic standpoint, enabling the student to get an accurate knowledge of bacteria uncomplicated by the subject of pathology which has often been confused with books on bacteriology.

"How Do Bacteria Produce Disease?" is the title of a chapter which very carefully analyzes the different methods whereby disease may result from bacterial infection. The protection and defence of the host against bacterial invasion including the natural and humoral defences is explained in a scientific manner and also is arranged in such sequence as to make it perfectly clear to the student.

As a whole, the book is one which deals with the subject of bacteria in a very modern and scientific manner and is recommended to all practitioners of dentistry who desire to become familiar with the modern knowledge of bacteria relating to dentistry.

While the book is written for dental students, it covers the field thoroughly enough to make it a valuable book to anyone interested in bacteriology.

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*Bacterial Infection—With Special Reference to Dental Practice, by J. T. T. Appleton, Jr., B.S., D.D.S., illustrated with 91 engravings and 5 colored plates, published by Lea & Febiger, Philadelphia, Pa. Price $6.00.

IN MEMORIAM

A Tribute

RESOLUTIONS passed by the New York Society of Orthodontists December 8, 1926. Geo. H. Caddick, Lourie J. Porter, Augustus B. Holt, Necrology Committee.

In the passing of Dr. C. W. B. Wheeler, a member of our Society, we as individuals, have lost a most genial associate and the association one of its most loyal supporters since its inception.

It is, therefore, fitting that we, as members of the New York Society of Orthodontists, should place upon the Society records, an expression of our appreciation of the high and consistent character of Dr. Wheeler as exemplified in his daily life.

Dr. C. W. B. Wheeler

Dr. Wheeler was a man of unquestioned integrity, absolute sincerity, and worthiness of purpose, while through his genial manner and disposition, his presence at our meetings was always an inspiration and his influence an assurance of careful and harmonious action.

At home and abroad, Dr. Wheeler was known as a friend of all mankind and was active in every good cause. Always constant in his devotion to duty, he never failed to carry his convictions into the actual practices of every-day life and never weakened when came the test for courage to stand by his convictions as to what he believed to be right.

Dr. Wheeler was an interested and tireless worker in our organization and only those who were closely associated with him in his service, which was always cheerfully rendered, can ever fully appreciate all that his work has meant and will continue to mean in the future.

Dr. Wheeler has gone from among us, but can never be forgotten by any member of this Society who has known him, while the influence of his life and the results of his service will live on.

We, the members of this Society, cherish the remembrance of our acquaintance with Dr. Wheeler and shall continue to feel and to know, as individuals and as a Society, that we are better for having known him so well.

We shall hope that the acquaintance and friendship formed here may last throughout all eternity and thus be an everlasting joy.

We write no "finis" to lives like his,
For in our hearts he yet lives on.
Still with us sounds his cheery laugh,
Still close we feel his handclasp warm.

Times when he won he made no boast,
Times when he lost he tried again,
Gave where his help was needed most,
Played well his part in life's short game.

All, all too brief the years he lived,
But fraught with good pressed down and full.
To us it falls to "carry on,"
Along the trail he helped to blaze.

ORTHODONTIC NEWS AND NOTES

The American Society of Orthodontists

The annual meeting of the American Society of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, Illinois, May 2, 3, 4, and 5, 1927. A splendid program has been prepared. All members of the American Dental Association are cordially invited.

Please note that the date of this meeting has been advanced one day from the time stated in previous announcements.—Dr. Charles R. Baker, Secretary-Treasurer, 708 Church Street, Evanston, Ill.

American Society of Orthodontists Round Table Discussion

The organization of the round table luncheon in Chicago, May 4, has been partially completed up to this time. Reports that have been turned in so far to the General Chairman are listed below. All members of the American Society of Orthodontists who desire to participate in the round table discussion in Chicago and who have not previously been identified with any particular subject or table will please communicate with Dr. William A. Murray, 636 Church Street, Evanston, Illinois. The various chairmen who have not, previous to this date, sent in the names of the members of their round table groups will please send this information to the general chairman as early as possible. The organization as completed up to date of going to press is as follows:

General chairman, Dr. H. C. Pollock, 4482 Washington Ave., St. Louis, Missouri.

Table No. 1.

Topic.—"What is the present status of the laboratory-made orthodontic appliance? Is it doing any service for the public or is it in the aggregate a failure? After all the question, does it benefit the public? Can this question be discussed unbiased by orthodontists?"

Chairman, Dr. C. R. Baker, Evanston, Ill.

Vice-Chairman, Dr. R. C. Willett, Peoria, Ill.

Members of this group up to time of going to press:

Dr. F. R. Blumenthal, Boston, Mass.
Dr. S. W. Bradley, Ottawa, Ont., Canada.
Dr. J. D. McCoy, Los Angeles, Calif.
Dr. H. F. Hoffman, Denver, Colo.
Dr. F. C. Rogers, St. Louis, Mo.

Table No. 2.

Topic.—"On account of the constantly increasing demand for orthodontic service should the general practitioner be encouraged to prepare himself to include orthodontic treatment in his practice?"

Chairman, Dr. Oscar E. Busby, Dallas, Tex.

Vice-Chairman, Dr. P. G. Spencer, Waco, Tex.

Members of this group up to time of going to press:

Dr. E. E. Richardson, San Francisco, Calif.
Dr. John W. Ross, Philadelphia, Pa.
Dr. Wm. E. Flesher, Oklahoma City, Okla.
Dr. N. H. Coleman, Wichita Falls, Tex.
Dr. B. J. MacGinnis, Beaumont, Tex.
Dr. A. B. Conly, Dallas, Tex.
Dr. Martin Dewey, New York, N. Y.
Dr. Frank F. Perry, Montgomery, Ala.

Table No. 3.

Topic.—"Is the present orthodontic training in dental schools adequate?

(a) Should the course of instruction be extended?

(b) Is the present course of instruction comprehensive enough for the student entering general practice?"

Chairman, Dr. Frank M. Casto, Cleveland, Ohio.

Vice-Chairman, Dr. John V. Mershon, Philadelphia, Pa.

Members of this group up to time of going to press:

Dr. L. W. Baker, Boston, Mass.
Dr. E. G. Jones, Columbus, Ohio.
Dr. LeRoy Johnson, Philadelphia, Pa.
Dr. T. L. Grisamore, Chicago, Ill.
Dr. A. J. Hall, Ann Arbor, Mich.
Dr. M. E. Ernst, St. Paul, Minn.
Dr. H. A. Pullen, Buffalo, N. Y.
Dr. W. W. Woodbury, Halifax, Nova Scotia.

Table No. 4.

Topic.—"From clinical experience and observation viewed from an entirely practical and unbiased standpoint, is there any particular outstanding factor which is responsible for the prevalence of malocclusion as observed in everyday practice; if so, what is the practical and popular reaction to this question?"

Chairman, Dr. D. Willard Flint, Pittsburgh, Pa.

Vice-Chairman, Walter Ellis, Buffalo, N. Y.

Members of this group up to time of going to press:

Dr. J. A. Burril, Chicago, Ill.
Dr. Joseph Eby, New York City, N. Y.

Dr. O. A. Oliver, Nashville, Tenn.
Dr. Ernest Bach, Toledo, Ohio.
Dr. George W. Grieve, Toronto, Canada.
Dr. H. E. Kelsey, Baltimore, Md.

Table No. 5.

Topic.—"So-called rapid treatment vs. slow and conservative treatment. What is the trend of opinion?"

Chairman, Dr. J. A. Gorman, New Orleans, La.

Table No. 6.

Topic.—"What is the prevailing opinion about the treatment of deciduous dentures, Class I, Class II, Class III, and the expansion of the deciduous mandibular and maxillary arches?"

Chairman, Dr. Herbert C. Hopkins, Washington, D. C.
Vice-Chairman, Dr. Carlton B. Mott, Asheville, N. C.

Table No. 7.

Topic.—"Is the matter of prophylaxis in orthodontic treatment pretty generally neglected in your observation? Should the orthodontists stress this point and discuss it more in order to deliver better service?"

Chairman, Dr. Harry L. Hosmer, Detroit, Mich.

Table No. 8.

Topic.—"The present status of jaw and arch anomalies as correlated with body growth, with special reference to endocrine influences."

Chairman, Dr. Clinton C. Howard, Atlanta, Ga.
Vice-Chairman, Dr. Harry Holder, Nashville, Tenn.

Members of this group up to time of going to press:

Dr. Leo M. Shanley, St. Louis, Mo.
Dr. H. F. Sturdevant, Portland, Ore.
Dr. A. H. Suggett, San Francisco, Calif.
Dr. Milo Hellman, New York, N. Y.
Dr. B. Frank Gray, San Francisco, Calif.
Dr. John A. McPhail, Cincinnati, Ohio.
Dr. Archie B. Brusse, Denver, Colo.
Dr. Albert W. Crosby, New Haven, Conn.
Dr. Oscar Carrabine, New York, N. Y.
Dr. A. LeRoy Johnson, Philadelphia, Pa.
Dr. Ira B. Stilson, Providence, R. I.
Dr. George B. Crozat, New Orleans, La.
Dr. P. R. Ashplant, Newburg, N. Y.

Table No. 9.

Topic.—"Why do teeth decay under bands? What is the best method to prevent such decay? What are the advantages of direct and indirect methods of band making, etc.?"

Chairman, Dr. Joseph E. Johnson, Louisville, Ky.
Vice-Chairman, Dr. Thad Morrison, Atlanta, Ga.

Table No. 10.

Topic.—"From an entirely practical standpoint and from observation in day to day practice, what is the present reaction to the proposition of root absorption during orthodontic treatment?"

Chairman, Dr. A. H. Ketcham, Denver, Colo.

Vice-Chairman, Dr. Milo Hellman, 40 E. 41st St., New York City.

Members of this group up to time of going to press:

Dr. Harry A. Allshouse, Jr., Kansas City, Mo.
Dr. Wm. T. Chapman, El Paso, Tex.
Dr. Robert W. Gaston, New Orleans, La.
Dr. Louis M. James, Kansas City, Mo.
Dr. Chas. C. A. Mann, Seattle, Wash.
Dr. H. L. Morehouse, Spokane, Wash.
Dr. Wm. B. Stevenson, Amarillo, Tex.
Dr. Hugh Tarpley, Quincy, Ill.
Dr. Albert E. Voss, Los Angeles, Calif.
Dr. Homer B. Robison, Great Bend, Kans.
Dr. T. G. Duckworth, San Antonio, Tex.
Dr. Hugh K. Hatfield, Boston, Mass.
Dr. Frederick B. Noyes, Chicago, Ill.
Dr. Ralph Howarth, Cleveland, Ohio

Table No. 11.

Topic.—"Discussion of patient's comfort during orthodontic treatment."

Chairman, Dr. Charles A. Spahn, Newark, N. J.

Vice-Chairman, Dr. Lowrie J. Porter, New York, N. Y.

Members of this group up to time of going to press:

Dr. Andrew F. Jackson, Philadelphia, Pa.
Dr. Leuman M. Waugh, New York, N. Y.
Dr. Frank Clawson, Plainfield, N. J.
Dr. Chauncey Egel, Westfield, N. J.
Dr. J. D. Locke, Grand Rapids, Mich.
Dr. W. A. Hillis, Greenwich, Conn.
Dr. B. Abell, Toledo, Ohio.
Dr. N. C. Leonard, Baltimore, Md.

Table No. 12.

Topic.—"If the practice of orthodontia is a true science, what is the most feasible plan to extend the service it has to offer to the masses in a competent manner?"

Chairman, Dr. Hugh G. Tanzey, Kansas City, Mo.

Vice-Chairman, Dr. Wm. J. Brady, Kansas City, Mo.

Members of this group up to time of going to press:

Dr. C. M. McCauley, Los Angeles, Calif.
Dr. B. G. DeVries, Minneapolis, Minn.
Dr. Abram Hoffman, Buffalo, N. Y.
Dr. Frank A. Delabarre, Boston, Mass.
Dr. T. O. Gorman, San Antonio, Tex.
Dr. Wm. Humphrey, Denver, Colo.
Dr. J. W. Ford, Chicago, Ill.
Dr. Lloyd S. Lourie, Chicago, Ill.

Table No. 13.

Topic.—"What do you think is the best, most practical and most satisfactory method, from the standpoint of the patient alone, of handling cases one hundred miles or more remote from a skilled orthodontist?"

Chairman, Dr. Oliver W. White, Detroit, Mich.

Vice-Chairman, Dr. Milton T. Watson, Detroit, Mich.

Members of this group up to time of going to press:

Dr. Samuel Lewis, Detroit, Mich.
Dr. Burt Abell, Toledo, Ohio.

Table No. 14.

Topic.—"Is progress in diagnosis desirable? Are intraoral occlusal diagnoses adequate and reliable? Are gnathostatic diagnostic procedures an improvement over occlusal methods?"

Chairman, Dr. B. E. Lischer, St. Louis, Mo.

Vice-Chairman, Dr. A. C. Rohde, Milwaukee, Wisc.

Members of this group up to time of going to press:

Dr. O. W. Brandhorst, St. Louis, Mo.
Dr. M. N. Federspiel, Milwaukee, Wisc.
Dr. C. A. Hawley, Washington, D. C.
Dr. Norman Hillyer, Brooklyn, N. Y.
Dr. F. W. Nash, Washington, D. C.
Dr. F. T. Murlless, Hartford, Conn.
Dr. Allen Scott, San Francisco, Calif.
Dr. Ralph Waldron, Newark, N. J.

Table No. 15.

Topic.—"What would you like in the way of future programs for the American Society of Orthodontists?"

Chairman, Dr. William A. Murray, Evanston, Ill.

St. Louis Study Club of Dentistry—Clinic and Dinner

The St. Louis Study Club of Dentistry will hold its ninth annual clinic and dinner on Saturday, April 2, 1927, at the Gatesworth Hotel, Union and Lindell Boulevards.

The clinic, which will start promptly at two o'clock, will consist of the following subjects:

Dental Ceramics
Fixed Bridgework
Full Denture
Dental Roentgenology
Operative Dentistry
Clinical Dental Prophylaxis
Rizadontia (Root Canal Technic)
Conduction and Local Anesthesia
Tooth Form and Cavity Preparation
Dental Economics
Oral Diagnosis and Diseases of the Mouth

Following the clinic, a dinner will be served at 6:30 o'clock.

The St. Louis Study Club of Dentistry, organized in 1919 and in continuous operation since that time, is maintained for the purpose of teaching advanced dental knowledge to practicing dentists, without charge.

A cordial invitation is extended to all the members of the profession to attend this clinic and dinner.

Bulletins descriptive of the Study Club may be had by addressing Dr. Frank C. Rodgers, 309 Wall Building, St. Louis.

The Canadian Dental Association—The Ontario Dental Association

The Diamond Jubilee Convention of the Canadian Dental Association will be held at the Sixtieth Anniversary Convention of the Ontario Dental Association at the King Edward Hotel, Toronto, May 16, 17, 18, 19, 1927.

A cordial welcome will be extended to guests from the United States.

European Orthodontological Society

The next annual meeting of the European Orthodontological Society will take place in London at the Langham Hotel, Portland Place, on Thursday and Friday, July 21 and 22, 1927.

Notes of Interest

Dr. Landis H. Wirt, formerly of South Bend, Indiana, announces the removal of his office to 901 Congress Building, Miami, Florida, where he will practice orthodontia exclusively.

Dr. Arthur H. Jones has moved his office to 1017-18 Paul Brown Building, St. Louis, Mo.

Dr. Hugh Grun Tanzey, Kansas City, Mo., announces that Dr. Richard Cuthbert Brown, recently of the Forsythe Dental Infirmary for Children in Boston, Mass., will be associated with him and devote his practice to the care of children's teeth. The downtown office is Suite 508 Commerce Building, and the Country Club Plaza office is 215 Tower Building.

Dr. Carl P. Cline wishes to announce he will open an office in Norfolk, Virginia, 418 Medical Arts Building. His practice will be limited to orthodontia.

Dr. Donald F. Mosher has removed his office from 105 Hunter Avenue to 605 Bryant Building, Kansas City, Mo.

Dr. Guy B. Fairchild of the Dewey School of Orthodontia, New York, wishes to announce the removal of his office from Grand Forks, North Dakota, to 318 Bradley Building, Duluth, Minn.

Dr. Arthur W. Sobey wishes to announce that Dr. J. Kester Diment will be associated with him in the practice of orthodontia, 1216 Flood Building, San Francisco, Calif.

Dr. Max Fendler announces the removal of his offices to Suite 606-8 Central National Bank Building, Seventh and Olive Streets, St. Louis, Mo.

Dr. Oren A. Oliver announces the removal of his office to Suite 1101-2 Medical Arts Building, Nashville, Tennessee. Practice limited to orthodontia.

Dr. James M. Gray announces to the dental and medical profession that he is now limiting his practice to the treatment of pyorrhea alveolaris, 317 Metropolitan Building, Grand and Olive Streets, St. Louis, Mo.

DIRECTORY OF ORTHODONTIC SOCIETIES

The Eastern Association of Graduates of the Angle School of Orthodontia

Officers:

President, Dr. J. Lowe Young, New York City
Vice-President, Dr. George W. Grieve, Toronto, Canada
Secretary, Dr. E. Santley Butler, New York City
Treasurer, Dr. Walter S. Watson, New York City

Executive Committee:

Dr. Milo Hellman, Chairman
Dr. Herbert A. Pullen
Dr. Hugh K. Hatfield

Regular Meetings:

Saturday, January 29th, at Buffalo, N. Y.
Saturday, March 28th, at Boston, Mass.

Annual Meeting:

Monday and Tuesday, May 9th and 10th, at the Hotel Vanderbilt, New York City

Southern Society of Orthodontists

Officers:

President, Dr. Harry A. Holder, Nashville, Tenn.
President-Elect, Dr. Harry E. Kelsey, Baltimore, Md.
Secretary-Treas., Dr. Oren A. Oliver, Nashville, Tenn.

Meetings:

Monday, Tuesday, Wednesday, February 28th, March 1 and 2, 1927, at the Battery Park Hotel, Asheville, N. C.

The Great Lakes Association of Orthodontists

Officers:

President, Dr. Walter S. Sargeant, Toledo, Ohio
President-Elect, Dr. Earl H. Teetzel, Detroit, Mich.
Secretary-Treas., Dr. Ernest N. Bach, Toledo, Ohio

Board of Censors:

Dr. Harry L. Hosmer, Detroit, Mich.
Dr. James D. Locke, Grand Rapids, Mich.
Dr. Frank R. Woods, Detroit, Mich.

Meetings:

Regular meetings are the first Wednesday of November and the first Wednesday of February. The next regular meeting will be held at the Book-Cadillac Hotel, Detroit, Wednesday, February 2, 1927.

The American Society of Orthodontists

Officers:

President, Dr. Joseph D. Eby, New York City
President-Elect, Dr. Walter H. Ellis, Buffalo, N. Y.
Secretary-Treas., Dr. Charles R. Baker, Evanston, Ill.
Librarian, Dr. Abram Hoffman, Buffalo, N. Y.

Board of Censors:

Dr. Oren A. Oliver, Nashville, Tenn.
Dr. H. C. Pollock, St. Louis, Mo.
Dr. William E. Flesher, Oklahoma City, Okla.

Meetings:

Monday, Tuesday, Wednesday, and Thursday, May 2, 3, 4, 5, 1927, at Edgewater Beach Hotel, Chicago, Ill.

The Southwestern Society of Orthodontists

Officers:

President, Dr. W. T. Chapman, El Paso, Texas
President-Elect, Dr. O. H. McCarty, Tulsa, Okla.
Secretary-Treas., Dr. P. G. Spencer, Waco, Texas

Meetings:

November 2, 3, and 4, 1927, at El Paso, Texas.

European Orthodontological Society

Officers:

President, Mr. George Northcroft, London, England.
Vice-President, Dr. Hans Hecht, Berlin, Germany.
Secretary, Mr. A. C. Lockett, London, England.
Treasurer, Dr. E. F. Day, London, England.

Meetings:

July 21, 22 and 23, 1927, London, England.

The Pacific Coast Society of Orthodontists

Officers:

President, Dr. W. R. Dinham, Portland, Oregon.
Vice-President, Dr. E. C. Read, Long Beach, Calif.
Secretary, Dr. F. A. Leslie, Oakland, Calif.
Dr. James D. McCoy (Southern California), Los Angeles, Calif.
Dr. Robert Dunn (Northern California), San Francisco, Calif.
Dr. H. L. Morehouse (Washington-Oregon), Spokane, Wash.

Officers of Sections:

Southern California Section:
Chairman, Dr. Harvey A. Stryker
Secretary, Dr. Alfred Higson

Northern California Section:
Chairman, Dr. Thomas Sweet
Secretary, Dr. Howard Dunn

Washington-Oregon Section:
President, Dr. C. C. Mann
Vice-President, Dr. M. H. Fisher
Secretary, Dr. Geo. A. Baker

Meetings:

Southern California Section, second Friday of March, June, September, and December, 1927.

Northern California Section, second Tuesday of March, June, September, and December, 1927.

Washington-Oregon Section, July 18, 19 and 20, and November 7, 1927.